MODERN MECHANICS AND INVENTIONS

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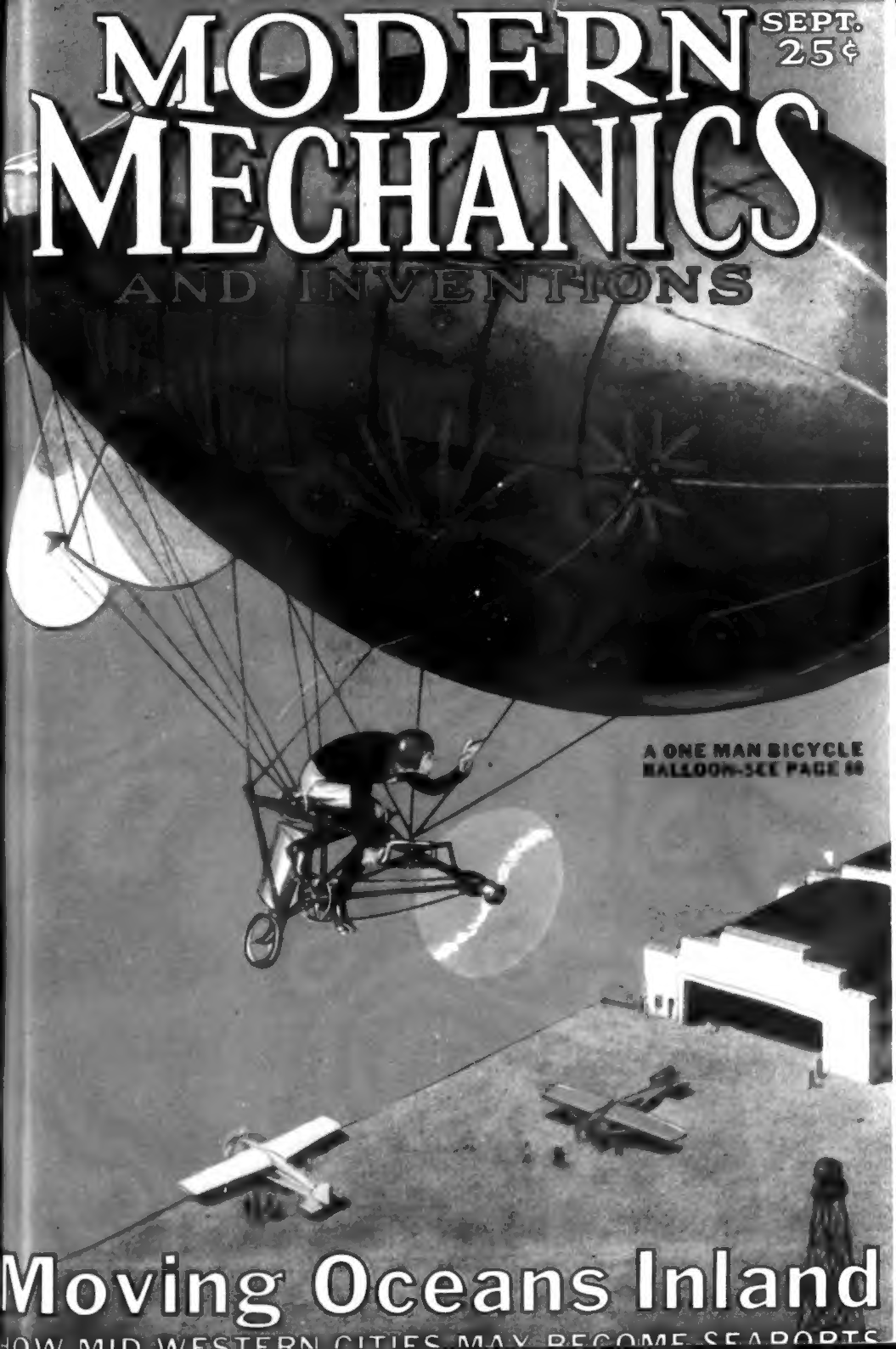


A ONE MAN BICYCLE BALLOON—SEE PAGE 88

Moving Oceans Inland

HOW MID-WESTERN CITIES MAY BECOME SEAPORTS

Have You the COURAGE To Take It?

—this $2,000,000.00 Guarantee of a JOB and RAISE?

Of course you'd like to earn $50 or $75 or $100 a week—you'd like to do more interesting work—you'd like to get into a line that offers a real future—but do you know how to go about *getting* these things?

"Only one other man and I, of six taking California State Board examination for Architect passed. Then I realized the thorough and practical training given by American School. In 18 months I have gone from timer to Chief Draftsman, in charge of all architectural and engineering work in one of the oldest offices here." R. L. Wetzman, Los Angeles, Cal.

If you have been thinking of "taking a course" but have held back because you were afraid you didn't have education enough to learn better-paid work—if you have hesitated to take the risk that it would actually land you in the better position and increase your salary—*then here's the best news you ever heard in your life!*

I want to tell you about DRAFTING, and show you that it offers you everything in pay and opportunity that you could hope for. I want to show you that a fine Drafting job is now easily within your reach. And I want to set before you an amazing plan which we have worked out with the co-operation of some of the biggest employers and engineers in America, to prepare you at home, in spare time, get you the job and raise your pay—absolutely without risk of a penny on your part.

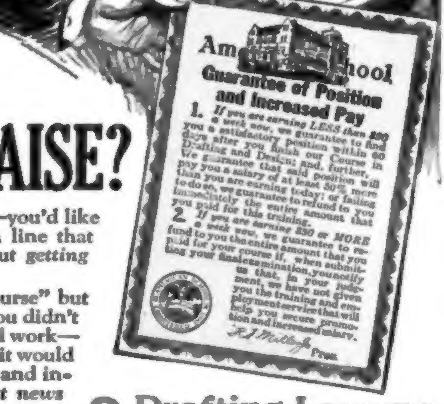
Thousands of men—not a bit smarter than you, with no more schooling or experience have gone from poorly paid positions as clerks, mechanics, building trade workers and laborers into Drafting positions paying $50.00 to $100.00 a week, with our help. Now with a job and a raise waiting for you *as soon as you are ready for it*, all it takes is the COURAGE to go after it—now if you remain in the rut it's because you choose to, not because you have to.

"When I started American School training in the Spring of 1918 I was working 16 hours a night, seven nights a week for $1.63 a night. That Fall I got a job in the Engineering Department of a large firm near here. Today I work 5½ days a week and my salary is larger than I ever dreamed of when I began that course in Mechanical Drafting." R. H. Heaverne, South Bend, Ind.

Come Into DRAFTING!

I wish I had the room here to tell you all about DRAFTING—how it has become the most important branch of every kind of manufacturing and building construction work—how fascinating the work is—the fine bunch of fellows you'll work with—the big salaries paid—the wonderful chances for advancement. How, while Drafting is white-collar office work, it is hooked up closely with big projects and big men, and offers the thrill that goes with making plans which govern every move of the men who do the work. All this inside dope takes a 36 page book to describe and I'll be glad to send you a copy free when you mail the coupon for my no-risk job and raise plan.

O. C. MILLER, Director Extension Work.



3 Drafting Lessons *Actually* FREE

To Show You How Interesting and Simple DRAFTING Is

Maybe you think Drafting is "over your head"—that it takes artistic talent or some ability you haven't got. In that case you have a pleasant surprise coming to you. For I'll be glad to send you the first three lessons from our home-training to show you that the drawing of plans is purely mechanical, easily learned and the most interesting kind of work you ever tackled. It takes little enough courage *to look into* this wonderful opportunity—just mail the coupon and see for yourself how you like Drafting and our guaranteed way to get into it.

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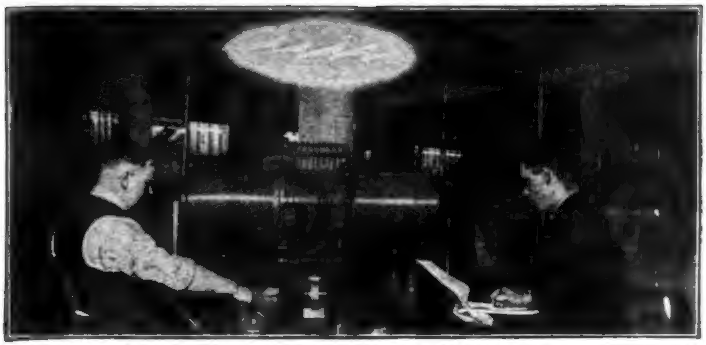

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MODERN MECHANICS AND INVENTIONS

VOL. II NO. 5 PRICE 25 CENTS

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SEPTEMBER, 1929

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Edited by Experts

Listed below are the members of the Modern Mechanics Board of Editors, all qualified by national repute to serve as authorities. They will gladly answer questions from readers concerning their departments. Address them in care of this magazine, Robbinsdale, Minn.

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Published monthly by Fawcett Publications, Inc., at 501 7th Ave. So., Minneapolis, Minnesota. MODERN MECHANICS AND INVENTIONS entered as second class matter September 26th, 1928, at the Post Office, Minneapolis, Minnesota, under the act of March 3rd, 187[illegible] W. H. Fawcett, Publisher; Roscoe Fawcett, Managing Editor; Jack Smalley, Assistant Managing Editor. Copyright, 1929. Advertising offices at 1480 Pure Oil Building, Wabash Ave., and Wacker Drive (Phone: State 2955), Chicago, Ill., and 52 Vanderbilt Ave., Room 171[illegible] (Phone: Vanderbilt 8490), New York City. All manuscripts should be addressed to our editorial office at Robbinsdale, Minn. Manuscripts will not be returned unless accompanied by return postage. Advertising forms close on the 20th of the third preceding month. Price 25 cents a copy; $2.50 a year in the United States and possessions. Other Postal Unions, $3.00 per year. Printed in U. S. A.

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Ex-Clerk Earns 150% More Money

R. D. Baxter, former bookkeeper, is now head salesman of his division. In 5 years his salary increased 150%. "My success is due directly to N. S. T. A."

Who Else Wants to Raise Their Pay 700% or More?

Can It Be An Accident When Man After Man Raises His Pay—Each One Taking The Same Identical Steps? If You Are One Who Aspires To Earn REAL Money—If You Want To Get Out Of A Monotonous, Low-Pay Job, Find Out About This Tested Plan For Increasing Incomes. It Has Raised More Salaries Than All The "Pull" And Luck In The World!

Get a Copy of This Amazing Book Free

Let's be practical. You want to make more money. . . A few years ago the three men pictured above were in the same situation. They had the urge to increase their pay—but didn't know how to do it.

Take J. H. Huppert, for instance. A plumber's apprentice at $23 to $25 a week. Naturally he was dissatisfied with such low pay. But like so many other men he was caught in a blind alley job—he could see no way out.

And then something happened! A certain book fell into his hands. Between its covers, he discovered certain facts and secrets he had never dreamed of. Within a period of three months he had earned more than his old job paid him in two years! One week's pay amounted to $525!

Remarkable Salary Increases

A lucky accident? Not a bit of it! Other men, too, who raised their salaries after reading these vital facts are numbered by the thousands! After R. D. Baxter read them, his salary increased 150%. Charles B. Barth writes that he "went from a life of want at $600 a year to a life of plenty at $6,000 a year!"

The Secret of Big Pay

How did they do it? What did the book show them? Just this:—Every one of these men realized that Salesmanship offers bigger rewards and delivers them QUICKER than any other line of work under the sun. This vital book, "The Secrets Of Modern Dynamic Salesmanship," revealed to them the real TRUTH about the art of selling. It blasted dozens of old theories and told them exactly how the great sales records of nationally-known star salesmen have been achieved. And not only that, it outlined a simple plan that will enable almost any man to master scientific salesmanship without losing a day or dollar from his present position.

A Few Weeks—Then Bigger Pay

There was nothing "different" about these men when they started. Salesmanship is just like any other profession. It has certain fundamental rules and laws—that you can master just as easily as you learned the alphabet. And through the NATIONAL DEMONSTRATION METHOD—an exclusive feature of the N. S. T. A. system of SALESMANSHIP training—you can acquire the equivalent of actual experience while studying.

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If we were asking several dollars a copy for "The Secrets Of Modern Dynamic Salesmanship" you might hesitate. But it is now FREE. So you get your copy now. Learn the real facts about the selling profession, and about the tremendous demand for trained salesmen in every line, to fill city and traveling positions paying up to $5,000 and $10,000 a year. (Last year this association received calls for over 50,000 N. S. T. A. members from Wholesalers, Manufacturers and Jobbers.) A copy is yours for the asking, and your request entails no obligation. Simply fill out and mail the coupon above. Do it now!

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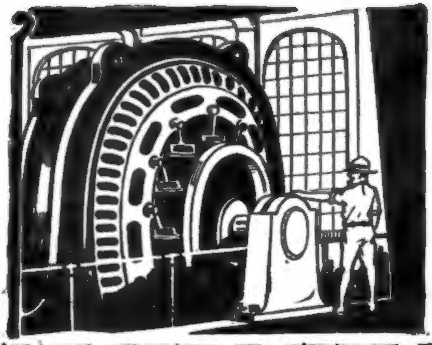
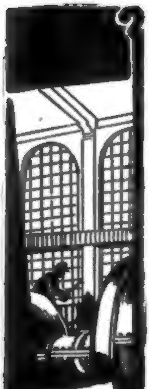
You Fellows Who Want BIG PAY Get into ELECTRICITY





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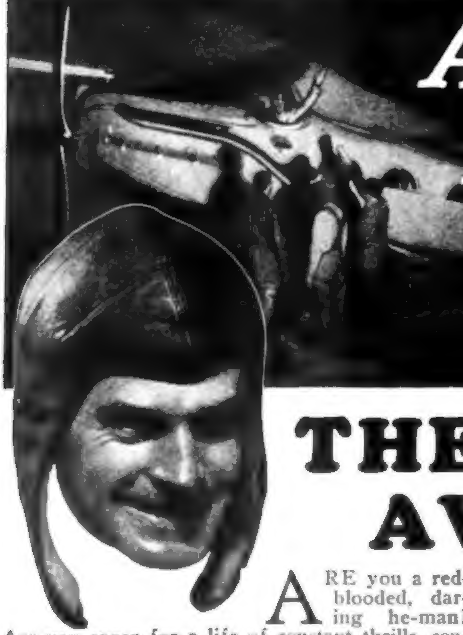

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By This Home Study Method

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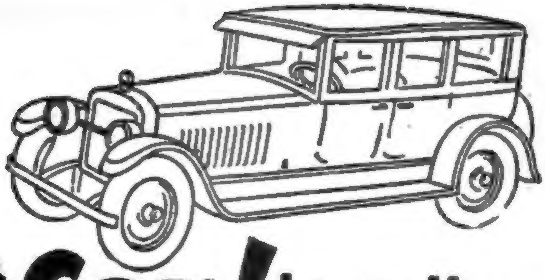

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With these books you don't have to worry about auto troubles. Illustrations are so clear and explanations are so simple that [redacted] can understand them. All phases of automobile engineering fully covered. Engines, chassis, carburetors, ignition systems, transmissions, differentials—in fact every part of a modern automobile explained from the standpoint of theory and practice.

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One of the best things about these money making books is the Jiffy Index, which puts vital facts at your finger tips. You don't have to read the books through; you don't have to spend long hours over them. This Index enables you to put your finger on the information wanted in a jiffy.

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There are no strings to this offer—it means just what it says. Send name and address on the coupon and all of the five big books—the complete set—will be sent you for examination. Remember, one fact alone which you can find in these books may save you an expensive repair, or help you to a better job.

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Yes, we include a certificate of membership in the American Technical Society, which entitles you to free consultation on any subject relating to automobile engineering. We have over a million dollars of resources enabling us to get co-operation of the largest automobile manufacturers and dealers who have furnished us plans and photographs. This membership, which you get for an entire year free, entitles you to consultation with 15 automobile experts, any of whom will be ready to help you at all times. You can write or wire any time for special information. Answers will be sent promptly without cost.

FOR FREE OFFER USE COUPON

American Technical Society, Dept. A-6320
Drexel Ave. at 58th St., Chicago, Ill.

I would like to look at the five big auto books—send them on your free offer. I will pay the few cents delivery charges. If I like them, I will send you $2.00 when I have had the books fifteen days, and then $3.00 a month until the special price of only $24.80 is paid. Otherwise I will return the books at your expense. You are to include, without charge, free consulting membership certificate in the American Technical Society.

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At last—a quick, complete, fascinating way to learn Drafting, and learn it right! Experts acknowledge my new, simple, easy "Picture Method" to be the first new idea in teaching Drafting in 30 years. It's the most easily-grasped, sound and sensible plan ever devised for Home Study instruction—so clear, so interesting, so practical that almost before you know it, you're through—have finished—and are ready to go to work on a Big Pay Job.

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That's what drafting positions lead to. And the draftsman's never out of work the year 'round—for he's the King-Pin of Industry—the man they've got to have. Not a wheel can turn, not a brick can be laid, not a wire can be strung, until the job has first been planned and drawn on paper by a draftsman. Why don't you get into work like that? Why don't you be a man they can't get along without—a Big Pay Man with a year 'round Big Pay Job? You can—it's easy—I'll show you how!

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With my new method, I'll help you get ready for a Big Pay job so quickly you will be astonished. Spare time only needed. With my method—you see how it's done, and you do it yourself almost **automatically.** It's amazingly simple—yet so thorough and complete you learn Drafting from A to Z—learn it so you can sit in with the best of them on the Jobs that pay Big Money.

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Don't sign up for any training until you've investigated my amazing new method. Mail coupon for Big FREE Book. See my great Earn-while-Learning Plan—see the big Professional Drafting Outfit you get at no extra cost—learn about my Nation-wide Job Service—my positive Money Back Agreement. Mail coupon NOW!

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L. L. COOKE SCHOOL OF DRAFTING
Dept. 686, 2132-2158 Lawrence Ave.
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Send me your book "Draw Big Pay in Drafting" and tell me more about your "Picture Method." This does not obligate me in any way.

Name.....

Address.....

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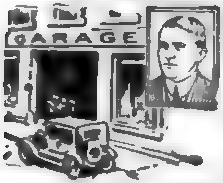
This Is a Machine Age—and all Machinery Starts with DRAFTING

—takes *only* 8 weeks to get a big job



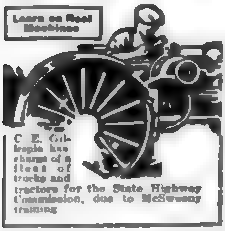
George Smith owns an agency and repair shop in West Alexandria, Ohio. He makes $200 a week.

and Earn $75 to $125 a Week As Auto or Aviation Expert

Learn the auto and tractor business by the McSweeny method, then step out and get a good job at $75 to $125 a week or open your own repair shop and make up to $10,000 a year. Trained men are needed everywhere. Opportunities galore! Eight weeks training fits you to open repair shop or to go on with one of the big firms waiting for trained men. Read what George Smith and C. E. Gillespie have done. Hundreds of other McSweeny trained men can tell as interesting facts. Every month McSweeny men who complete their training are taking the place of half-trained and incompletely self-trained men.

Money Back Guarantee

If, after completing my training, you are not satisfied, if you are not qualified to accept a big-pay job, your tuition will be refunded.



C. E. Gillespie has charge of a fleet of trucks and tractors for the State Highway Commission, due to McSweeny training.

LEARN IN ONLY 8 WEEKS

Simple, thorough, practical shop methods. You learn the "why" of everything you do, then learn to do it right. You do real work with real tools and real equipment. No book studying. Very little schooling necessary. Any man from 16 to 40 can learn. Write today for Big Special Limited Time Tuition Offer.

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Dept. A-14-J, Chester at Thirtieth Street, Cleveland, Ohio, or 263 Madison Street, Memphis, Tenn.
Without cost or obligation, send me your big FREE book on Autos and Aviation, also, full details of your special tuition offer.

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McSWEENY SCHOOLS

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ELECTRICITY — PAYS BIG!

LEARN IN 90 DAYS

ON ACTUAL MACHINERY—NO BOOKS

Don't let the world bluff you. Get into electricity—earn $50.00 to $150.00 a week—and hold your head as high as the next man. You can do it easily by coming to my famous electrical school. In 12 short weeks you'll pack in many years of practical knowledge. You work shoulder to shoulder with expert instructors on full-sized, moving whirling motors, generators, batteries, switchboards, telephone and telegraph systems, etc., etc. McSweeny trained men get the biggest paying jobs. Every day I receive requests for graduates.

No Education or Experience Needed

No books to read. No dry lectures to listen to. You learn by doing. I don't care if you can't tell a motor from a horse and-buggy now. When you graduate I guarantee that you'll know electricity from "A" to "Z". If you're not fitted to fill a big-pay job I'll refund every penny of your tuition.

Satisfaction Guaranteed

I will refund every penny of your tuition if you are not satisfied. You are the sole judge of McSweeny training.

Big Illustrated Book Sent FREE

Today, right now, take the first step out of that low pay rut. Mail the coupon to me for big, illustrated book on ELECTRICITY Act today. Get my special Remarkable Tuition offer. **Just Mail Coupon!**

IT'S EASY THIS WAY

Fascinating practical shop work in my big school! Fits you. Not a correspondence course.

COMPLETE RADIO COURSE

J. H. McSweeny, Pres.,
McSweeny Electrical Schools
Dept. E-13-J, Cleveland, Ohio.
Dear Mac, Without obligation send me a copy of your big free book on ELECTRICITY and details of remarkable tuition offer and complete radio course.

Name .....
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Town ..... State .....

McSWEENY ELECTRICAL SCHOOL

Dept. E-13-J, Cleveland, Ohio

The Shop Mail-Box

SAY, Gang, you ought to see that new edition of the FLYING MANUAL that's on the way through the press and will soon be on your newsstands! We on the Editorial Board aren't much on drummin' up trade, but a word or two has just got to be said anent that forthcoming book. You remember the flash we have been giving you from time to time on the Baby Bullet? And Sam Rabl's pontoons, and the 3 cylinder motorcycle cylindered radial engine?

Boy, howdy! They're here at last! After cajoling the artistic temperament of Stewart Rouse we finally managed to induce him to get his story done. Sam has been on deck for some few days, and just the other day Howard Wagle, a new contributor to this office, albeit he's an old reader of the magazine, popped through with his story on the building of the three-cylinder motor which created such a furore way last December when we mentioned we would publish plans for the building of a modern three-cylinder radial engine from motorcycle parts.

Some have written the editors wondering if we were going to get these articles into print before we died. We can announce to all interested that the wait will have been well worth the trouble.

Because there was no room in the magazine for some time to come (we have to plan a long time ahead on some features for the book) we will not withhold these from the readers of the magazine, but will publish them all at one time in the FLYING MANUAL. Eventually they will make their way into the magazine in modified form according to the dictates of space requirements, but the Editors felt that those who have waited so patiently for these really great articles ought to get them all in one bouquet. The new FLYING MANUAL carries 'em all without expurgations. This will be on the local stands in a month or so. A word to the wise is sufficient!

Of course, some of the material has been scheduled for the magazine immediately. Next month will carry the first article on the Baby Bullet by Stewart Rouse, and we think after seeing it you will agree we are right when we say that this triumvirate is the best group of how-to-builds ever cornered by any group of editors. Temporarily we're patting ourselves on the backs. But wait till you see all of them all at one time in that new MANUAL . . .

Funny how popular gliding is. Take this letter for example, which was addressed to Weston Farmer who wrote about the Northrop Glider in the June issue:

Dear Sir:

Otterbein college, at Westerville, organized an aeronautics club this last year. It is not so large yet but we are figuring on doing things next school year. We saw your writeup on the Northrop Glider in the June issue of Modern Mechanics and were very much interested in it, so much so in fact that we planned to build it to practice flying in. In the article it was stated that the materials would cost about $30, but upon adding up listed prices we find this to be in error. We are naturally interested in getting next to your source of supply. We want to start work on the glider as soon as possible so as to have it ready when school opens again next Fall. We would be very much obliged if you could give us some advice as to the cost of the material.

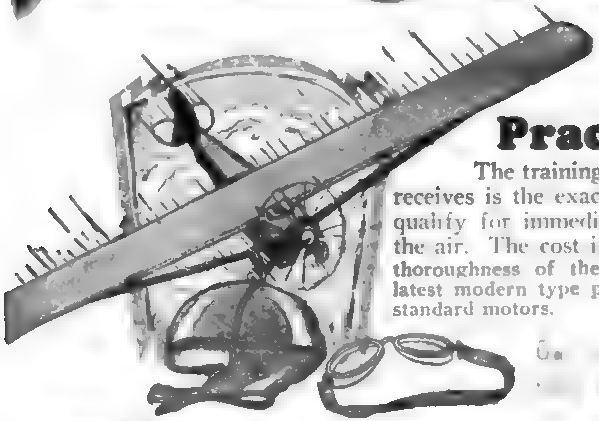
Very truly yours,
An "air-minded" college student,
Francis Bundy

Westerville, Ohio.

(Continued on page 14)

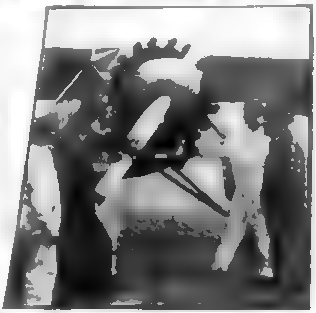
"The Von Hoffmann Graduate Qualifies"

Von Hoffmann Aircraft School



Will Give You a Thorough—Practical Training

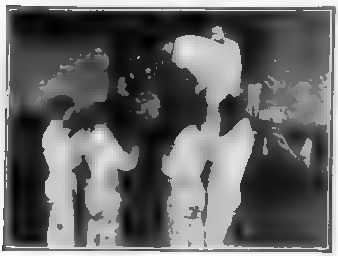
The training which the Von Hoffmann student receives is the exact training which he must have to qualify for immediate positions on the ground or in the air. The cost is low considering daily flying, the thoroughness of theoretical and ground instruction on latest modern type planes, Wright Whirlwind and other standard motors.



A Record to Be Proud Of

Our record to date shows that every Von Hoffmann graduate has received a U. S. Government License.

All Airplanes used by us for both instruction and passenger service are planes licensed by the U. S. Government and our instructors are U. S. Licensed Transport Pilots and U. S. Licensed Mechanics. Our equipment is new and of modern design, subject to daily U. S. Government Inspection. (We have a resident U. S. Government Inspector on the field—think what this means to you.)



Easy Monthly Payments

It is easy to pay the Von Hoffmann way because small monthly payments are extended. Let us show you how you can start now and pay later, even after you have finished the course of training.

We teach you by actual flying and practical instruction; no long course needed. No student bond required.

Von Hoffmann Aircraft School
221 Lambert-St. Louis Flying Field
(Lindbergh's Own Field)
St. Louis, Mo.

Free Information Coupon

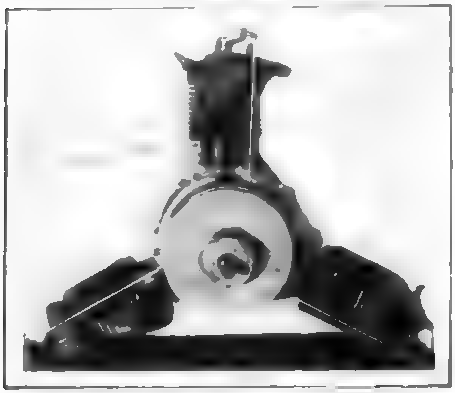
Von Hoffmann Aircraft School,
221 Lambert-St. Louis Flying Field (Lindbergh's Own Field), St. Louis, Mo.
Please mail FREE information at once.

Name ..... Address .....
Town ..... State ..... Age .....

Long Awaited 30-Horsepower Three-Cylinder Engine Plans in Manual!

(Continued from page 12)

Mr. Farmer replied that the high quotation Mr. Bundy mentions was possibly obtained by pricing the materials in finished form. Marvin A. Northrop, 700 Washington Ave. North, Minneapolis, is selling glider parts knockdown. A letter will no doubt bring the desired information.



This is the engine built by Howard Wagle from suggestions in December, 1928, Modern Mechanics. Parts used are Harley standard. See page 16. This motor design is contained in the new Flying Manual, now on the press, which will soon be at your local newsstand. Reserve your copy now!

In connection with the picture above, showing the three-cylinder radial engine which was built by Howard Wagle and which has proven reliable as a church, so to speak, in actual flying operation, we were very surprised and not a little pleased to know that the motor, on which the plans are shortly to be published, can be built for about $25 to $50, depending upon how much work the amateur builder can do himself.

FLIES TO 9,000 FEET

Installed in an Anzani Parasol, Mr. Wagle's engine flew to 9,000 feet on tests. This is as good as the Anzani performance. Though the engine develops a little less horsepower than the Anzani, its light weight gives it about the same per horsepower performance. Says Mr. Wagle, in writing us about the engine:

It runs very evenly and with no more than the usual amount of vibration. We have flown it to 9,000 feet, and the performance is just as good as the Anzani. The engine weighs only 106 lbs. and we calculate we get 32 h.p. The revolutions are low to make for long life. I use a Zenith carburetor . . .

Here's a letter from a hearty Double M fan who is all for a motorcycling department:

Modern Mechanics
Editorial Department.
Dear Sir:

I have been reading your magazine for some time and it is the best thing in its line that I have ever laid my eyes on.

Yet there are some things that, according to the gang that get the magazine around here, could be improved on, and they are twofold: First, the most important, and that is why not have a Motorcycling Department? You have departments for aviation, automobiling, motor and sailboating, so why not take just a little corner and use it for a motorcycling department? I am sure that if you put this up to the rest of the gang it will meet with their hearty approval. The second is, why waste a lot of perfectly good space, that could be used for a motorcycling department, on those wild stories?

I will close hoping to find a motorcycling department in the next copy of Modern Mechanics.

Wishing you the best of success.

Yours for motorcycling,
HERBERT STUART.

Eureka, Cal.

That's a large order. The material really comes under the heading of Motor Mechanics. We'll have to have Mr. Kuns take that suggestion up! Possibly he will want to include something on the two-wheeled angel-makers in his department.

Here's a letter from a glider and lightplane enthusiast with whom the editors have been in close touch. Mr. Oman included a photo of the glider he mentions, but as the shot was a little blurred we were unable to reproduce it. Mr. Oman's letter:

Gentlemen:

Inclosed find a photo of our "Gotha" Glider in the air during one of our four successful test flights April 16 at the Roby speedway here in Hammond. Our club instructor is at the controls, Mr. Don "Swede" Flora. This glider was constructed by student members of our local Calumet Glider Club last winter, from the "Gotha" glider drawings furnished by Mr. Flora. All club members are now ready to take flight instruction and make short hops from behind a tow car. Later Mr. Flora intends to take off from one of our many local sand dunes for distance and duration of flight, as tow flights are not official. The Calumet Glider Club is only five months old.

Yours very truly,
GUS OMAN, Pres.
418 Elm St., Hammond, Ind.

Major Rockwell, U.S.R. Air Corps, Says:

"I'll Train You at Home

and Until You Have an Aviation Job Paying $300 to $400 a Month!"

Major Rockwell
World War Flyer
Who Will Teach You

Major Rockwell is a famous World War flyer, decorated with the Legion of Honor and the War Cross. He is now devoting himself to teaching Aviation, and he will train you for a position in this great new industry as only a Veteran World War Flyer can train you. Under Major Rockwell's guidance your future in Aviation is assured.

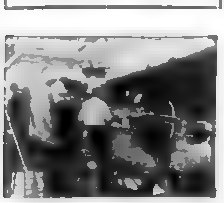
I make this amazing offer, for a short time and to a limited number, to supply the crying need for trained men. Here is your opportunity to get into this uncrowded, fascinating field with a definite certainty of your future.

In 12 Weeks!

Just devote about an hour a day to my Home Study Course, and in 12 weeks you can be mastering the principles of Ground Training, which are necessary before you take your place in any branch of Aviation. In a few short months I will give you practical aviation training and prepare you for one of the big pay thrilling jobs open only to men thoroughly trained in Aviation.

No Advance Education Necessary or Experience Needed

You don't need to have a high school or college education to master my course. You do not even need to know anything about airplanes, motors or mechanics. My home course is thorough and complete. Everything is so clearly explained, with easy-to-understand text and pictures, that in a few short months you will be able to grasp every fundamental principle of Aviation ground work and you will be well on the road to qualify for any important aviation job paying $300 to $400 a month. My Home Study Course will give you all the knowledge necessary to pass the government's written examinations for mechanics' or pilots' licenses.



Your Job Is Here

You Learn Principles of Aviation at Home Then Choose Any One of 40 Ground Jobs. If You Want ACTUAL FLYING---

My home study course also teaches you the principles of flight. When you have completed the ground training come to Dayton — the birthplace of Aviation and the home of the Wright Brothers. You come here and get training at one of the finest and best equipped air ports in America. Here, where we can work hand in hand, you can qualify for a pilot's license and high pay flying job in passenger lines, mail service and other important branches of flying.

Employment Service

After you graduate I assist you in getting a job without any cost to you. Right now the demand for trained men is greater than the supply. A place is ready for you!

Only Trained Men Can Qualify in Aviation

The big money in Aviation does not go to the novice or apprentice. Only TRAINED men can command the high salaries. Employers are glad to pay big money for men who know Aviation—builders, mechanics, service and maintenance men, and flyers. Let me prepare you for one of the many high salaried Aviation jobs open to the trained man. I will prepare you to take your place in the most fascinating, fastest growing industry in the world. Act now while my special offer lasts. Rush this coupon to me for a copy of my famous free book.

Satisfaction or Money Back

I am so sure that you can learn Aviation with my help and step into a big aviation job that if you are not satisfied when you have finished my course, I agree to return every penny of your tuition.

MAJOR ROB'T L. ROCKWELL
THE DAYTON SCHOOL OF AVIATION
Desk K-2 DAYTON, OHIO

Get My No-Risk Plan My Big Book Explains ALL I'll send it FREE

Major Rob't L. Rockwell
The Dayton School of Aviation
Desk K-2, Dayton, Ohio.

Dear Major:—Please send me FREE and without obligation a copy of your famous book on Aviation, also your special tuition and position offer.

Name .....
Address .....
Town ..... State..... Age .....

The Consulting Editor

ONE of the most interesting shots which has come to our attention for some time anent the uses to which the converted Henderson motor could be used is shown herewith. This photo is of the small basket used in conjunction with the small dirigible shown on page 81 of this issue and shows the little Henderson as adapted to this service.

Here's a puzzling question:

Dear Sirs:

In your magazine for July on page 140 is an oscillating steam engine. Could I build this in a larger size about ½ h.p. or 2-inch bore, 2½-inch stroke. I fail to see how the parts remain open long enough to fill the cylinder when the crank is turning. I would like to build an engine large enough to pull a 12-volt generator.

Thanking you, I remain,

C. C. PETERSON.

R. 4, Aurora, Nebraska.

I had to scratch my head over this one for a minute to see if friend Peterson really meant what he said about driving a small generator of the wattage output he seemed to indicate, and then I dropped him this line, after explaining how the valves worked:

It is impractical to build an oscillating engine as large as you ask for because the friction of the valve face drawn by a spring strong enough to offset the steam pressure would make the engine very uneconomical. To pull a 12-volt generator you will need a two-cylinder single-acting 1¼" x 1¼" Westinghouse engine running on from 60 to 70 lbs. of steam.

The Henderson motor which is installed in a small dirigible balloon in use near Dayton, Ohio. It is said to function perfectly.

BEFORE we run along to the next inquiry I feel constrained to run two pictures of unusual interest. One of them is a shot of a light plane built by a MODERN MECHANICS fan, who says:

Dear Sirs:

I am enclosing three small camera pictures of this ship, which are all the views I have of it.

We built this ship from parts which we bought from the Allison Airplane Company. The ship is built entirely of wood. It is extremely light only weighing 475 lbs. with a 30 h.p. Gnome motor.

I flew the ship last month and for a few errors in rigging, which we have to change, it flew good. It lands very slowly, due to its small wing loading.

HARRY RICHARDS.

1470 Middleton Road,
Cleveland, Ohio.

(Continued on page 18)

$350 a month

"I feel proud of my success in Radio to date. My profit during the last two months amounts to $700. I am making good and I have not finished my N. R. I. course yet. I am grateful for your training and co-operation to date and look forward to still bigger success when I graduate."

Clarence Heffelfinger,
Temple, Penna.

$500 a month

"When I enrolled with the N. R. I., I was a motorman on a trolley car. Now I have a fine, fast-growing Radio business. When only half way through the course started bringing in extra money. I made $420 in my spare time. Now I have a bank account of $2800 and about $300 worth of stock. It has all come from Radio since graduating less than six months ago. I cannot begin to express my thanks to you and all those connected with N. R. I. for what you have done for me."

Richard Butler, 3535 Sheffield St.,
Philadelphia, Pa.

$450 a month

"In addition to my regular work in what I believe to be the largest and best equipped Radio Shop in the Southwest, I am now operating KGFI. I am proud of the fact that I installed and put KGFI on the air without help of anyone except the N. R. I. I am averaging $450 per month."

Frank M. Jones,
922 Guadalupe St.,
San Angelo, Tex.

READ what Big Money my men make in RADIO

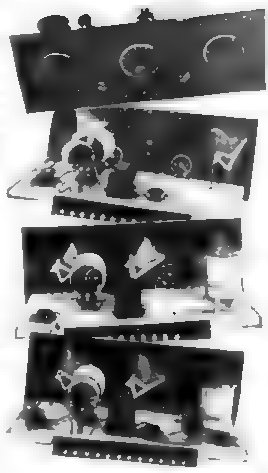
$150, $450, $500 a month. That's making real money. What business other than Radio offers such opportunities after six to twelve months' training? Name that I know of. More proof—a year ago electricians, farmers, mechanics, clerks, railroad men, bookkeepers, preachers, doctors and men from 78 other trades and professions enrolled with me to prepare for the Radio field.

A WONDERFUL [illegible] to make men trained for entertaining them up for Radio. Yes, but they had their eyes open. They knew what was and I knew—that knowledge makes big jobs and big opportunities. Some of Heffelfinger, Jones, and Butler [illegible] make something like this money before, although they probably worked just as hard—may be harder. Trained men are needed for the big jobs the amazing growth of Radio is creating.

WHY go along at $25, $30, $35 a week when the good Radio jobs pay $50 to $250 a week? Cut loose from drudgery, small pay, no-future jobs. Get into a live-wire field that offers you a real chance. You don't need a high school or college education to become a Radio Expert. Many of my most successful graduates didn't finish the grades.

I GIVE you six big outfits of Radio parts. With them you can build and experiment with one hundred different circuits—learn the "how" and "why" of practically every type of set made. This makes learning easy, interesting, fascinating, your training complete. Nothing else equals my method.

TELEVISION [illegible] Television can easily and quickly become as large a part of the whole Radio industry as today. Broadcasting stations will soon need trained men to install, maintain, inspect for the designing and building of sending and receiving sets. It won't wait for you. Get ready quick.



I GIVE YOU THE RADIO PARTS FOR A REAL EXPERIMENTAL LABORATORY

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(Continued from page 16)

Needless to say, since Mr. Richards was kind enough to send us shots, we put him on our mailing list to receive MODERN MECHANICS. His ship is very interesting, and shows what can be done with even the earlier of war time surplus motors.

The picture of Mr. Richards' Allison Biplane shown to the right shows a very neat biplane of orthodox construction, which ship, however, is a trifle ambitious for the average light-plane building enthusiast. Such a plane requires rather a large shop.

The second shot comes from Orville Hickman, and is interesting because it was taken not so very long ago, and is now a chapter from the development of the commercial aviation industry of the country. Reading from left to right, in front of an experimental Travel Air biplane, now manufactured on a quantity basis, are Beach, President of Travel Air, Orville Hickman of the Starling Company, and Kirkpatrick. Seated is Clyde V. Cessna, who later designed the Cessna monoplane and who is now head of his own company. The man standing under the prop spinner is none other than your friend Stearman, who designed the Stearman plane. In order to appreciate what strides the airplane industry is taking one has but to look back at this picture, taken several years ago when these men were connected with the old Travel Air Company.

Here's a letter of a type which we have been receiving for some time in the past since the publication of the Alco sportplane plans:

Dear Sir:

I have noticed in your plans for the Alco Sport Plane that the two-cylinder Lawrence engine is used with a two-throw crank shaft. I have a Lawrence motor and have done a lot of figuring on a two-throw shaft for it. But as the cylinders are in line and not off-set it doesn't seem practical.

Could you give me a sketch of it or some dope on the shaft?

Yours truly,

FRANK W. THOMPSON.
231 West Ave., Apt. 12,
Buffalo, N. Y.

A number of readers are building this plane, and several have been "stumped" on this same problem.

This Allison biplane was built by one of Modern Mechanics' readers from plans secured from the Allison Company. It is equipped with a 50 h. p. Gnome motor.

To Mr. Thompson's letter, which, as mentioned, is typical of many, we answer:

In building the two-throw crank for the Lawrence engine the con rods have to be offset. We saw a motor like that some time ago and it was a very sweet running job. At present Mr. Orville Hickman is completing an engine of this type and the Editors of Modern Mechanics have contracted for a story of its construction. So that's another good item on the cargo list!

Bear in mind, Gang, that the letters which we publish are of a nature as to be duplicated several times over in each month's correspondence. The reason we publish them is because we feel they are interesting to a great many. Questions of a narrower nature we are always glad to answer through the usual personal reply. Send 'em in. If they stump us we'll tell you someone who can answer you! S'long!

A group of employes of the Travel Air Company a few years ago. Now these men are designing planes themselves and operate their own factories.

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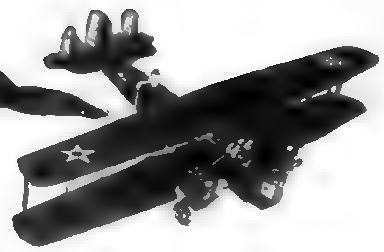

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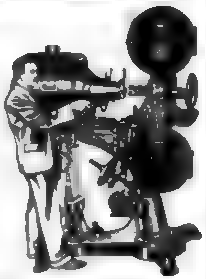

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As I started to get up, I heard a titter run around the table.

"Watch him make a fool of himself," I overheard someone whisper. "He's so bashful he's afraid of his own voice."

I knew they were expecting me to make myself ridiculous, but I only grinned inside.

I stood squarely on my two feet and started in!

"But When I Commenced to Speak"—

Almost from the first word, the smiles of doubt and derision faded from their faces. They were incredulous—amazed! Instantly the atmosphere became so tense that you could have heard a pin drop! No snickers nor sneers *now!* My voice, clear as a bell—strong, forceful, unfaltering—rang out through the banquet hall as I hammered home each point of my message with telling strokes! I let myself go—soaring to a smashing finale that almost brought them to their feet!

When I finished, there was an instant of dead silence! And then it came—a deafening wave of applause rolling up from one hundred pairs of hands—spontaneous, excited, thrilling!

What 20 Minutes a Day Will Show You

How to talk before your club or lodge
How to [illegible] meetings
How to [illegible] toasts
How to make [illegible] speech
How to tell [illegible] stories
How to make [illegible] speeches
How to [illegible] interestingly
How to [illegible]
How to [illegible] goods
How to train your memory.
How to enlarge your vocabulary.
How to overcome stage fright
How to develop self-confidence
How to acquire a winning personality
How to be the master of any situation

Was Once a "Human Clam"

After it was all over, Jack Hartray fell into step beside me as I left the hall. "Gee, that was a great speech!" he said enthusiastically. "You certainly raised yourself about 100% in the eyes of every person in that place tonight. . . . And yet they used to call you 'a human clam' and the quietest man in the office!"

It was true too. All my life I *had* been handicapped with a shy, timid and retiring nature. With only a limited education I never could express my ideas in a coherent forceful way. As a result I saw dozens of men with less ability pass me by simply because they were good talkers and knew how to create the right impression. It was maddening.

A Lucky Accident

At last I accidentally ran across a little book entitled *How to Work Wonders With Words*. Between its covers I discovered certain facts and secrets I had never dreamed of. Difficulties were swept away as I found a simple way to overcome timidity, stage-fright and self consciousness—and how to win advancement, popularity and success.

Today I hold the sort of position that I had always envied. My salary has been increased! I am not only in constant demand as a speaker in public but I am asked to more social affairs than I have time to attend. To sum it all up, I am meeting worth-while people, earning more than I ever dared expect and enjoying life to the fullest possible degree! And furthermore, the *sheer power of convincing speech* has been the big secret of my success!

The experience of Byron Munn is typical. Not only men who have made millions, but thousands of others have found success after learning the secrets of powerful, effective speech. Being able to say the right *thing* is the right *way* at the right time has perhaps been responsible for more brilliant success than any other one thing under the sun.

Get This Amazing Book FREE!

Right now, we offer to send you absolutely free, a copy of *How to Work Wonders With Words*. This remarkable little book will show you how to develop the previous "hidden knack" of effective speech that has brought success, social position, power and wealth to so many. It will open your eyes to a new realization of what life holds in store. See for yourself! There is no obligation. You can obtain your copy free by just sending the coupon.

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SEND NO MONEY. Just fill in Coupon Below. Pay on Delivery. Satisfaction Guaranteed or Money Refunded.

22 CAL. SIX SHOT BLANK AUTOMATIC $4.99
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You need no permit or license to own this newly invented high power but absolutely safe and harmless automatic. Positively not a toy. Built like a real automatic, same in construction, appearance, finish, weight and every other detail—except that it fires blank cartridges only. Handy for self-defense, frightens tramps, scares away dogs, handy in the house—a real home protector—without the danger of keeping dangerous firearms at home. Play a practical joke on your friends. Ideal at festivals, fairs, picnics, outings, camping, hikes, at football sports, etc., etc. Blue steel, case hardened frame. Makes powerful loud report. Has six shot magazine that can be reloaded instantly. Uses 22 cal. blank cartridges. Checkered Grip. Box of cartridges free with each automatic. Convenient pocket size. SEND NO MONEY. Pay on delivery $4.99 plus express charge. Fill in coupon below. NO PERMIT LICENSE REQUIRED. **Genuine Leather Holster Free with Each Pistol**

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No license or permit required to carry this newly patented Blank Automatic. Built like a real firearm, same in appearance, looks and powerful loud report, yet it is absolutely safe and harmless. Use it for protection—to scare away burglars, frighten tramps, drive away dogs, etc., for camping, outing, towns, in city or farm—or play practical joke on your friends. Uses 22 Cal. Blank cartridges. Can fire two shots simultaneously. Easy and quick to reload. Box of cartridges free with each pistol. Send No Money. Pay on delivery $2.85 plus small shipping charges. Fill in coupon below.

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With Two Bracelets. One of the greatest Bargains in America today. Storekeepers and installment Mail Order Houses charge a great deal more for this very watch. We import watches direct from Switzerland and give you the benefit of our savings. Absolutely the newest, dainty, fashionable, ladies' watch. White gold finish, engraved, assorted shape case, protected against tarnishing by new Chromium process. Exquisite dial with raised gold letter figures. Fully jeweled movement, guaranteed for two years. Silk grosgrain ribbon for day wear and rolled gold effect link bracelet for evening and party wear. An accurate timekeeper and a Bargain at $3.99. SEND NO MONEY. Pay on delivery. Fill in coupon below.

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$3.39

Built on entirely new principal, this Banjo is the latest thing out. Clear tone, easily tuned; you will be the life of the party in a short time. Anyone can easily learn to play this Banjo, with our Free instruction course. No previous experience necessary. Beautifully finished full size. Rush your order. Limited quantity at our special price of $3.39 plus shipping charges. SEND NO MONEY. Fill in coupon. Mail today.

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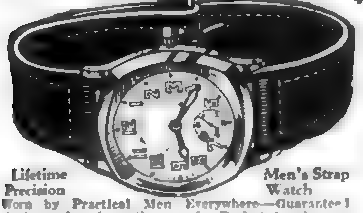

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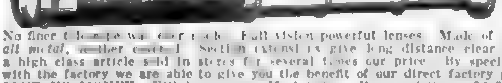
Jenkins Watch-Lighter $4.97

A combination of an elegant, high quality cigarette lighter with a fine, guaranteed 8A size watch. The watch is of the best Swiss make, 6-Jewel lever movement, carefully tested and adjusted, accurate timekeeper, with two years' written guarantee. The cigarette lighter is well-known U. S. make, very fine and elegant in appearance, yet strong and durable in construction. Leather covered sides, all metal parts of silver finish, non-tarnishable quality. $20.00 value. SEND NO MONEY. Just fill in coupon. Pay on delivery $4.97 plus postage.



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No finer telescope was ever made. Full vision powerful lenses. Made of highly polished *all metal*, weather resisting body. Sufficient extension to give long distance clear view. This is a high class article sold in stores for several times our price. By special arrangement with the factory we are able to give you the benefit of our direct factory price of $4.75. SEND NO MONEY. Fill in coupon. Mail today. Pay on delivery $4.75 and postage.

Men's Up-to-Date Strap Watch
$4.88

Our choice in square, rectangular or tonneau shape at same price. White Gold effect richly carved case, guaranteed not to tarnish or discolor, with extra fine Swiss 6 Jewel movement, shock-proof and weatherproof. Tested and adjusted for accurate timekeeping. Regular $15.00 value. Radium dial and hands, tells time in dark. SEND NO MONEY. Pay on delivery. Fill in coupon below.

Tear off this Coupon and mail

The Jenkins Corporation, Dept. 9-S-270, 685 Broadway, New York, N. Y.

Gentlemen: Kindly ship me C. O. D. the following advertised articles (check articles desired)

....6 Shot Blank Automatic	$4.99
....50 Shot Target Air Automatic	3.98
....New Style Ladies' Watch	3.99
....22 Cal. Repeater Blank Automatic	2.85
....Lifetime Precision Men's Watch	3.99
....French Photo Ring	1.97
....Latest Style Banjo	3.39
....Jenkins Watch Lighter	4.97
....Genuine Diamond Ring	4.98
....Up-to-Date Men's Strap Watch	4.88
....Genuine French Telescope	4.75

Name ..... Street .....

City ..... State .....

You can quickly have these prizes

Lowell Derbyshire, Ohio, is one of our many boys to get a bicycle. This opportunity is open to you. Mail the coupon now.

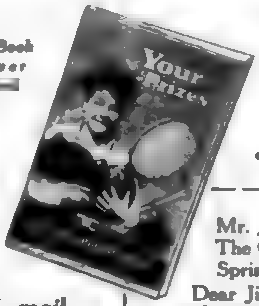
Oh Boy! How would you like to have a baseball glove, tennis racket, pair of boxing gloves, watch, or a swift and sturdy bicycle fully equipped? Many fellows are receiving these every day and it doesn't cost them a cent of their own money. They do this by being Crowell Junior Salesmen.

Your Big Opportunity

If you act at once you can join this group of happy Crowell Junior Salesmen. They deliver The American Magazine, Woman's Home Companion and Collier's The National Weekly to regular customers. This takes only a small part of their spare time and does not interfere with their school work or fun. Experience is not necessary. Simply send us your name and address. We will furnish all supplies.

This is Bernard Korn, Ohio, happily displaying his bicycle and many prizes he has recently won.

Our Prize Book shows over [illegible] *choices*



The coupon will bring you our New Book of Prizes

We have just published a new 150,000 edition of our new Prize Book—full of wonderful prizes you can have for a little easy fun. Get your copy Now!

clip and mail the coupon now

Fill out and mail the coupon today. In no time at all you will be earning your own spending money and receiving all the wonderful prizes a boy could want

Mr. Jim Thayer, Dept. 106
The Crowell Publishing Co.,
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Dear Jim: I want to earn money and some of your dandy prizes. Please start me off as a salesman.

My Name _____

Address _____

Town _____ *State* _____

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3 Tons Heats 8 Rooms

"My furnace has been in use for 3 years and our eight room house is always warm, including floors. I used 3 tons of hard coal last winter to heat our eight room house. You can use anything that will burn in the Bulldog. We often warm and remove the dampness during a stormy period in summer with waste paper." Leon F. Coons, Ellenville, N. Y.

"Heats as Good as Ever!"
In regard to the Bulldog Furnace: Our furnace has been in use 6 years and it heats as good as ever.—A. Cleopfil, R. F. D. No. 1, Rock Port, Mo.

Fuel Saved Pays for Furnace
"This is the second winter I have used the Bulldog and the savings in my coal bills have paid for my furnace!" Milton E. Spain, Casey, Ia.

Heats 8 Rooms Instead of One
"My 8 room house has 7 windows on the Northwest side downstairs, so it takes SOME heat! The Bulldog doesn't burn very much more coal than my old stove used to, and it heats the whole house, where my stove would heat only the one room it was in."
Ernest H. Marvell,
73 South St., Milford, N. H.

Cuts Coal Bills in Half
"I had a hot air furnace in our 7-room house before I got the Bulldog and our house was always cold. With the Bulldog it only takes *half as much* coal and we had weather below zero, and the house was nice and warm in the morning when we got up. We never have the draft on more than half an hour at a time, and it has the place red hot. It is easy to regulate and keeps the fire all day in mild weather."
Jess T. Conrad,
1211 W. Arch St. Shamokin, Pa.

No Money Down!

Small monthly payments. Installed almost as easily as a cook stove!

The Bulldog is sent to you for *free inspection*. Then, if satisfied, you make only small monthly payments at our remarkably low price. Write today! *Don't* miss this chance to cut down your fuel bills! *Install a Bulldog Furnace.* It comes to you completely erected—goes through any door—fits any height of basement—and you install it yourself in less than two hours! In fact, you can install the Bulldog just about as easily as a kitchen cook stove. *Don't* put up with the old fashioned stove heat or some outworn furnace—when you can so easily get the greatest advance in scientific heating at an astonishingly low price. The Bulldog burns almost *any* kind of fuel, from hard coal to cheap screenings. Keeps a wood fire over night. We have factory connections in both east and west and ship from the nearest point.

Send for Free Book

Learn how to have all the heat you want—where you want it—and save money! Remember the Bulldog is *different*—and *better!* Complete combustion of gases save 25% of your fuel bill. Exclusive Gable-Top Radiator receives *all* the direct rays of the fire. Exclusive oblong fire-pot is not only ideal for coal, but enables you to keep a wood fire over night. Remember—the Bulldog is sent for *free inspection*—then small monthly payments at an amazingly low price! Send for Free Book TODAY!

Bulldog Furnace Co., 19th and California Avenue, Dept. 22-56 Chicago, Ill.

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19th and California Ave., Dept. 22-56 Chicago
Without obligating me, please send me your free catalog and special offer on the Bulldog Furnace.
Have you a basement? Yes ☐ No ☐

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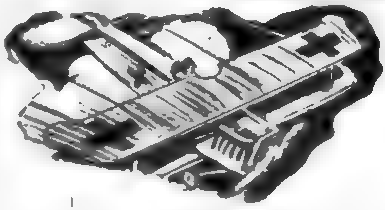

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FIVE PHANTOM ACES

in a thrilling front-line air story of reckless flyers bound together against a ruthless enemy.

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In collaboration with George F. Zimmer

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If your newsdealer is sold out, send 25 cents to Battle Stories Magazine, Fawcett Publications, Inc., Minneapolis, Minn., and a copy of the September issue will be mailed immediately to your address. Or, better yet, mail $1 (bill or stamps) and assure yourself of the next five issues.

WANTED-
for murder!

$1,000 Reward

In a dirty, forlorn shack by the river's edge they found the mutilated body of Genevieve Martin. Her pretty face was swollen and distorted. Marks on the slender throat showed that the girl had been brutally choked to death. Who had committed this ghastly crime? No one had seen the girl and her assailant enter the cottage. No one had seen the murderer depart. How could he be brought to justice?

Crimes like this have been solved—are being solved every day by Finger Print Experts. Every day we read in the papers of their exploits, hear of the mysteries they solve, the criminals they identify, the rewards they win. Finger Print Experts are always in the thick of the excitement, the heroes of the hour.

Not Experienced Detectives Just Ordinary men

Within the past few years, scores of men, men with no police experience, men with just ordinary grade school educations, have become Finger Print Experts. You can become a Finger Print Expert, too. Can you imagine a more fascinating line of work than this? More trained men are needed. Here is a real opportunity for you.

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Mail This *NOW* for Free Book

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Without any obligation whatever, send me your new, fully illustrated, FREE book of authentic detective tales, "Finger Prints"; also Confidential Report Operator No. 38 Made to His Chief.

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TO THOSE WHO GET INTO AVIATION
WHILE IT'S YOUNG

Pilots are not being developed fast enough to fill the need that the growth of aviation is demanding! Men with transport licenses are earning enormous salaries each month, and airports are always looking for good aviation mechanics. Opportunity knocks now!

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MODERN MECHANICS AND INVENTIONS MAGAZINE

Will Give You the Start You Need!

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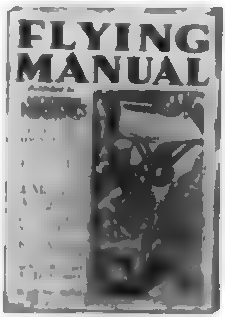

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GET YOUR COPY AT ONCE!

Science Explains the Conservation of Youth... *After 40!*

A WELL known scientist's new book about old age reveals facts which to many men will be amazing. Did you know that two-thirds of all men past middle age are said to have a certain seldom mentioned disorder? Do you know the frequent cause of this decline in vitality?

Common "Old Age" Symptoms

Medical men know this condition as hypertrophy of the prostate gland. Science now reveals that this swollen gland—painless in itself—not only often cheats men of vitality, but also bears on the bladder and is often directly responsible for sciatica, backache, pains in the legs and feet, and dizziness. When allowed to run on it is frequently the cause of cystitis, severe bladder inflammation.

65% Are Said to Have This Gland Disorder

Prostate trouble is now reached immediately by a new kind of safe home hygiene that goes directly to the gland itself, without drugs, medicine, massage or application of electricity. Absolutely safe. 50,000 men have used it to restore the prostate gland to normal functioning. The principle involved is recommended by many physicians. Amazing recoveries often made in six days. Another grateful effect is usually the immediate disappearance of chronic constipation. Usually the entire body is toned up. Either you feel ten years younger in six days or the treatment costs nothing.

Send for FREE Book

If you have gland trouble, or any of the symptoms mentioned, write today for scientist's free book, "Why Many Men Are Old at Forty." You can ask yourself certain frank questions that may reveal your true condition. Every man past forty should make this test, as insidious prostate disorder often leads to surgery. This book is absolutely free, but mail coupon immediately, as the edition is limited. Address

THE ELECTRO THERMAL COMPANY
3821 Morris Ave., Steubenville, O.

If you live West of the Rockies, address The Electro Thermal Co., 303 Van Nuys Building, Dept. 38-X, Los Angeles, California.

The Electro Thermal Company,
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Please send me FREE, and without obligation, a copy of your booklet, "Why Many Men are Old at 40." Mail in plain wrapper.

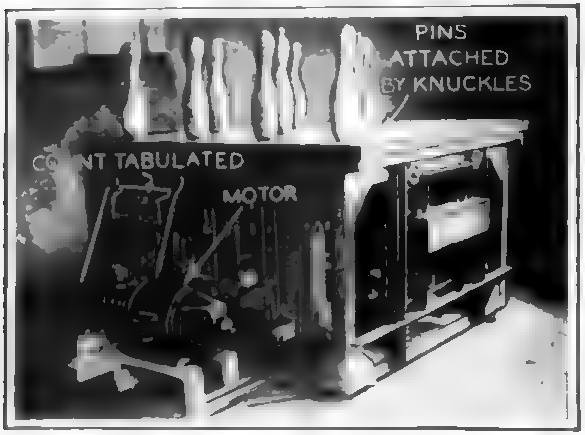
Name

Address

City

State

Ten-Pin Boys' Work in Bowling Alley Done by Machine



A BOWLING alley with essentially no difference from a regulation type is in operation in Germany, equipped with a machine that not only does the work of the ten-pin boy but also registers the count of the games and keeps the players' scores separate. The machine is mounted under the ten-pin platform. It stands the pins up after they have been knocked down, returns the balls and tabulates the count by an illuminated indicator. It is electrically operated, and no further attention need be paid it after the current has been turned on. The pins are attached to the platform by knuckles which allow a ball to topple the pins if it strikes or grazes them.

Coffee Used to Cool Motor

AS THE crew of the Swedish seaplane, *Sverige*, which recently attempted a trans-Atlantic flight from Stockholm, Sweden to New York, was resting after the ship was forced down at Skaptaros on the south coast of Iceland, the story was told how they poured their last reserve ration of coffee into the motor to cool it off. The flight was in command of Captain Alvin Ahrenberg. Lieutenant Axel Flodden, reserve pilot and Robert L. Jungland, radio operator and mechanic, were the other flyers. A leak in the gas tank caused the ship to come down.

A Rocket Voyage to the Moon

NO LONGER a fantasy, a rocket to the moon may be fired before another 12 months have passed. Discussion of interplanetary navigation reached a climax recently in a meeting of European scientists in the convention of the Societie Astronomique of France where the Hirach-Pelterie prize of 5,000 francs was awarded to Professor Herman Oberth for researches in this field.

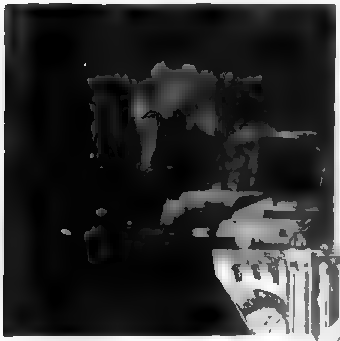
Professor Oberth has developed what is considered to be an entirely feasible plan for sending a rocket to the moon. The problem up to this time has been how to escape the terrestrial attraction of gravity and yet not make the experiment prohibitive by an excess load of fuel. This has been solved by constructing a double-tubed rocket emitting gases at a speed of 2,500 miles a second.

Seeing London Zoo by Jumbo Taxi

STRAPPED around the bodies of trained elephants like the wicker baskets that big game hunters use when traveling in the wilderness of Africa or India, comfortable seats provide visitors at the London Zoo with an unimpaired vision of the places of interest in the park. Passengers get on and off the "new vehicle" from a large platform built especially for this purpose.

Sightseeing this way is not very speedy, but safe.

How the LaSalle Problem Method Increases Your Salary



—Why in six months' time alone as many as 1,248 LaSalle members reported definite salary-increases totalling $1,399,507, an average increase per man of 89 per cent!

No matter what you are making now, you are interested in any plan which suggests a practical way to increase your earnings—within a comparatively short time. There is such a plan—it is known as the LaSalle Problem Method—and its practical value is attested by thousands of men who have employed it to plus their native aptitude with systematic training. Read these typical experiences:

Boosts Salary 137 Per Cent—"I worked hard for 4 years in a clerical position and had plenty of opportunities, but was not fitted to accept them. I saw that something had to be done if I ever hoped to get ahead. I had never had any training in accountancy, but I enrolled for the LaSalle Higher Accountancy course. Today, just fifteen months later I am Assistant Treasurer of my firm and enjoy the benefits of a 137 per cent increase in salary, and I have not yet finished the course."
PHILIP S. BLESSING, Pennsylvania.

From $55 a Month to $10,000 a Year—"When I first took your course in Traffic Management, thirteen years ago, I was a bill clerk with the B & O Railroad—at a salary of $55 a month. For the last five years I have successfully conducted a Freight Bureau of my own, through which I am now serving more than 500 clients. During these five years my income has averaged better than $10,000 a year. I owe my success entirely to LaSalle training."
S. MOSS, Jr., New York.

Steel Worker Becomes General Manager—"For a number of years I was assistant roller at the Carnegie Steel Mills. Realizing that hands and feet would not do for me any longer, I decided to give my brain a business training. Today I am Treasurer and General Manager of W. C. DuComb Co., Inc., Detroit—with easier hours, work that I like, and a larger income. LaSalle has been the instrument to my success."
RALPH H. BERNDT, Detroit.

Always a Bigger Opportunity Just Ahead—"Before I had completed my first course with LaSalle, I got the chance I had been looking for with this company of which I am now Sales Manager. Since that time it seems as though one opportunity has followed another, just as fast as I could make myself ready. Incidentally my salary has been increased more than 500 per cent."
E. T. ORCUTT, New Jersey.

When thousands of men in the United States and Canada (not to mention many hundreds in England, Australia, China and other foreign countries) choose the LaSalle Problem Method to speed their progress—when over 4,000 LaSalle members belong to the LaSalle One Hundred Per Cent Club, having more than doubled their incomes—when the average increase reported by other thousands is 89 per cent—surely the LaSalle Problem Method must offer an unusually sound way of securing quickly the kind of experience that can be coined. It does. And here are very good reasons why:

You Learn by Doing

Suppose it were your privilege every day to sit in conference with the head of your firm. Suppose every day he were to lay before you in systematic order the various problems he is compelled to solve, and were to explain to you the principles by which he solves them. Suppose that one by one you were to *work those problems out*—returning to him every day for counsel and assistance—

Granted that privilege, surely your advancement would be faster—*by far*—than that of the man who is compelled to pick up experience hit-or-miss.

Under the LaSalle Problem Method you pursue, to all intents and purposes, that identical plan. You advance by *solving practical problems.*

Only—instead of having at your command the counsel of a single individual—your *Chief*—you have back of you the organized experience of the largest business training institution in the world, the authoritative findings of scores of able specialists, the actual procedure of the most successful business houses.

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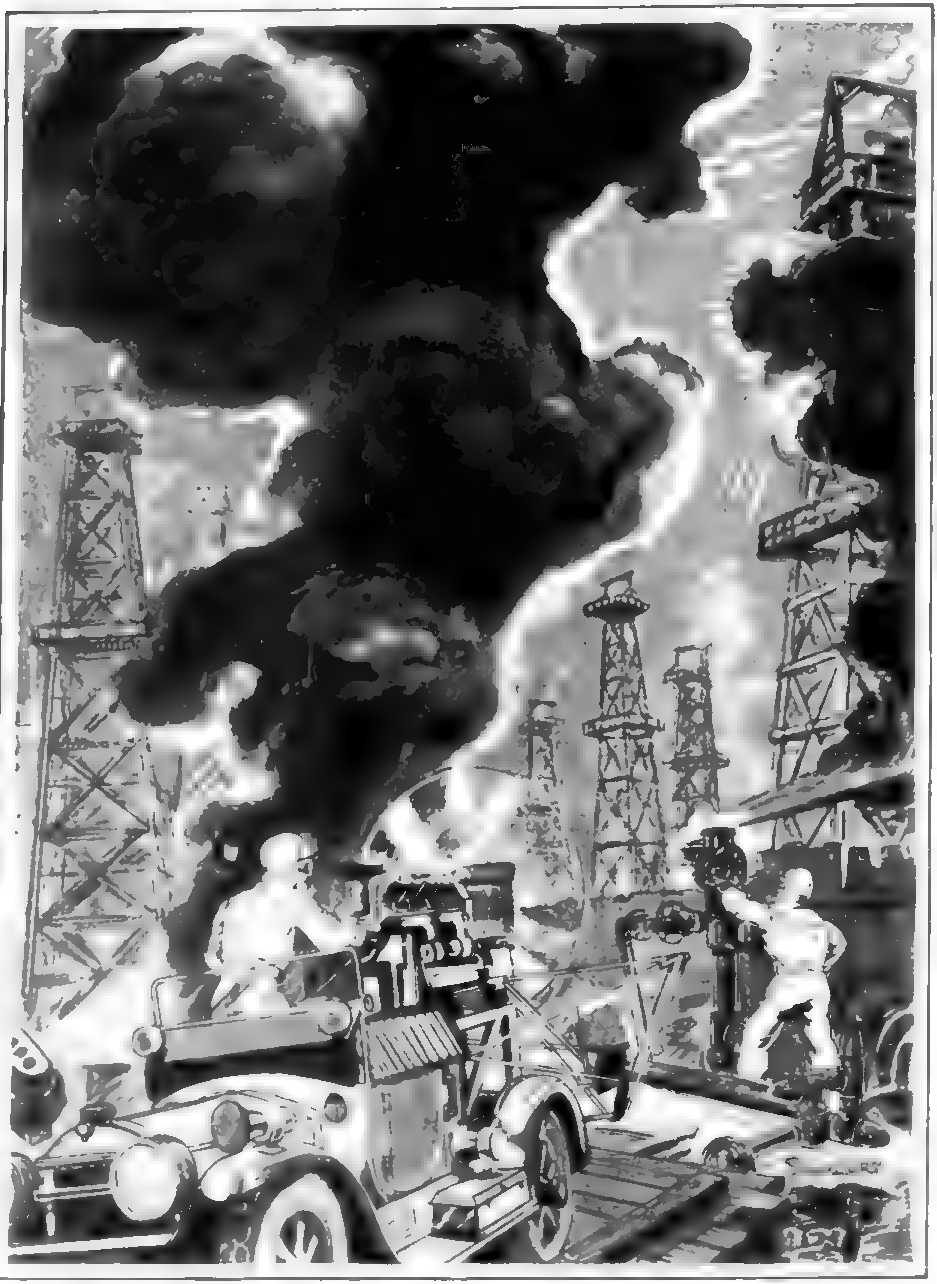
Airplane Propeller Blast Aids in Capping Oil Well Fire



A new method of fighting oil well fires, scourge of the producing fields, consists in mounting an airplane motor and propeller on the rear of a truck which is driven as close as possible to the blazing well and the propeller is turned on the flames. The blast is not, of course, sufficient to extinguish the flames entirely, but it blows heat and smoke away from the pipe and permits a fireman clad in an asbestos suit to approach the valves and close off the flow of oil. In this manner an oil well fire at Santa Fe Springs, California, was recently brought under control.

AN EDITORIAL

30 Days of Invention

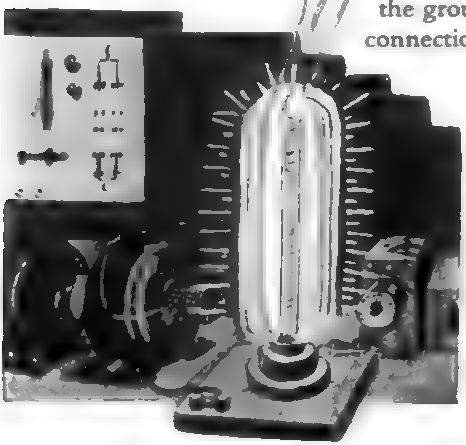
EVERY thirty days three thousand inventions are patented in the United States alone. Inventive brains are active!

Only a few will be startling. Some ideas may affect the course of our lives.

One of these is a new vacuum tube which broadcasts heat! Three pails of water were placed within range of the tube on a Schenectady laboratory table. In one was salt water. One contained distilled water, and another water from an ordinary faucet.

Ten feet away the salt solution boiled while the other two pails were cold. The blood of the operators, slightly salty, became insufferably hot, bringing on fainting.

Heat of a kind affecting blood temperature may now be broadcast to arctic explorers, keeping them warm as they work in the lightest of clothes. Tubercular patients may keep warm while lolling in the winter sun. Houses may be heated from a central radio heating plant. Steam can be generated from a distant power source.



Working obscurely, a New Yorker has invented a process for making cement from peanut shells. Cement is always in demand by industry. Waste peanut shells, wheat straw, sawdust are not. Presto! Utilize these waste products by transforming them to cement!

As you read this, trials are being made of a device by which an aerial observer can transmit maps to headquarters of his commander on the ground miles behind the lines. Television in connection will show the head of an army what the airplane is observing at the same time. Pity the ground troops in future wars!

An electric shovel has been built so large it can deposit 24 tons of materials on top of an 8-story building.

A non stop flight around the world, duplicating the voyage the sun apparently makes, is projected for the fall months.

Each 30 days sees the birth of some invention which creates new necessities, new modes of life. What next?

Moving OCEANS

The new Nicaragua Canal is to be 134 miles longer than the Panama Canal, now working to capacity. Route will cost a billion dollars and will utilize huge Lake Nicaragua. See the map below.

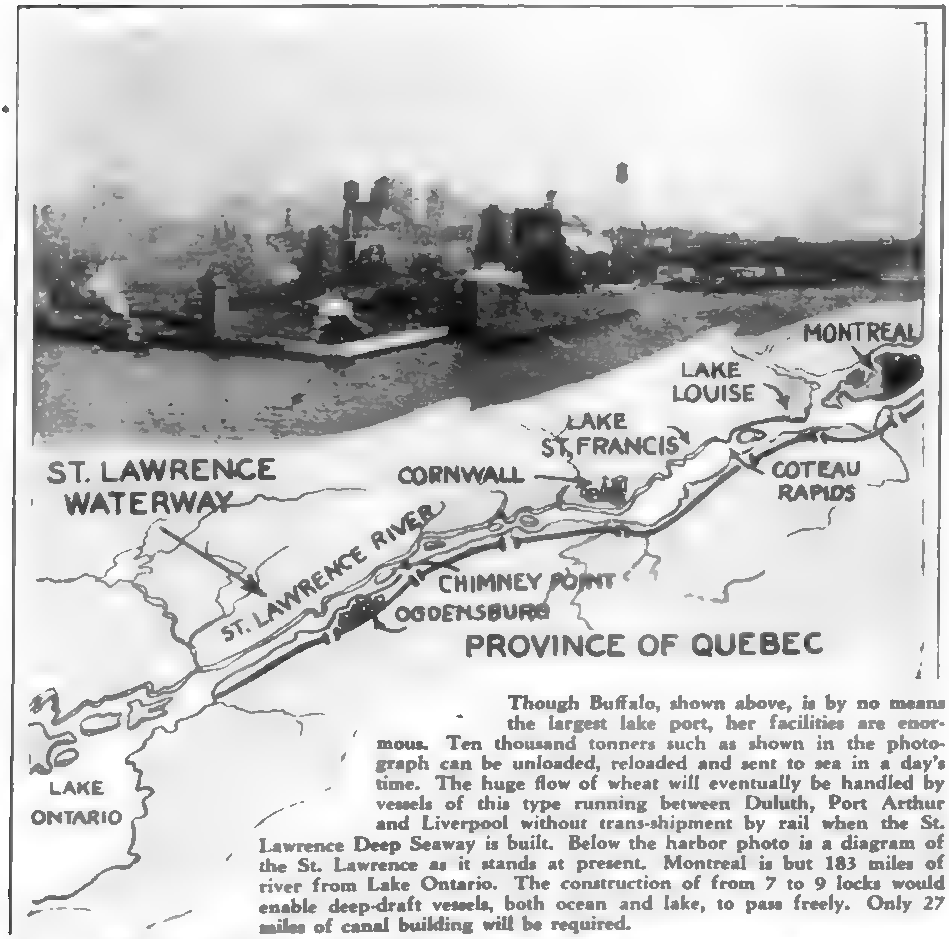
One of the most unusual photos ever published, showing an air view of the entire Panama canal. Panama, on the Pacific, is in the foreground. Miraflores Locks, Culebra Cut, Gatun Lake, and Colon on the Atlantic, follow, in the order named.

Locks similar to those shown carrying 10,000 to 15,000 ton lake freighters will be installed in the canal which is to link the Pacific with the Atlantic via Lake Nicaragua, one sailing day north of the Panama Canal.

INLAND

by JAMES N. MILLER
Washington Correspondent

Details showing how the ocean is to be moved to 400 Great Lakes seaports through the building of the St. Lawrence Deep Seaway! This article summarizes progress on three big seaway projects.



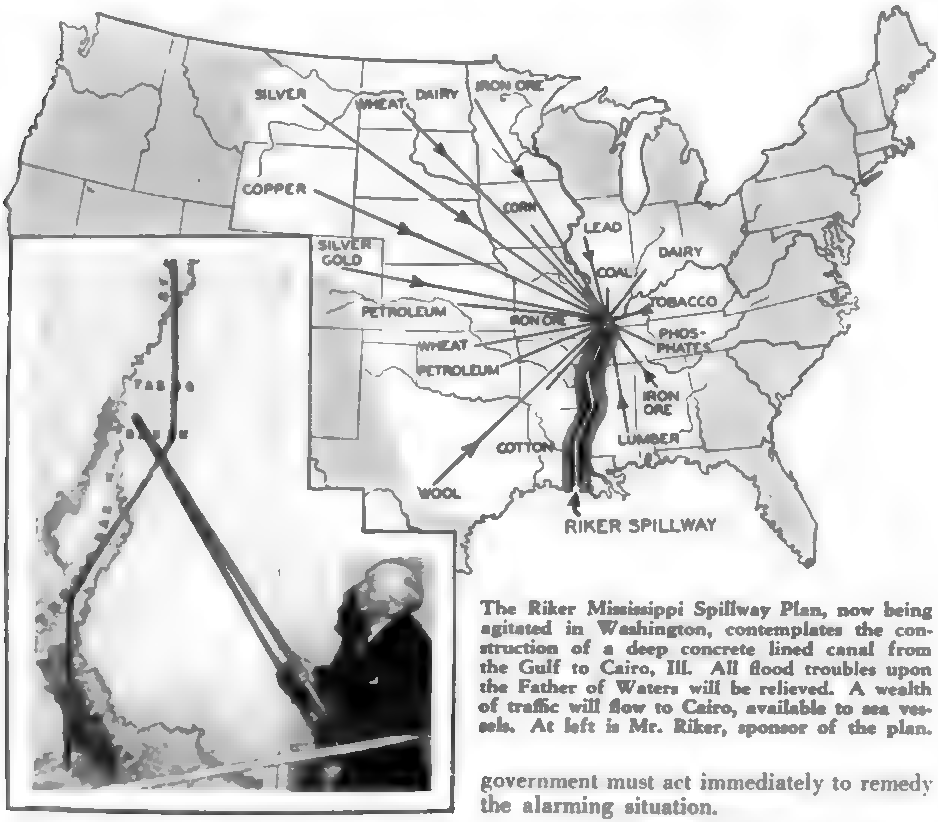
Though Buffalo, shown above, is by no means the largest lake port, her facilities are enormous. Ten thousand tonners such as shown in the photograph can be unloaded, reloaded and sent to sea in a day's time. The huge flow of wheat will eventually be handled by vessels of this type running between Duluth, Port Arthur and Liverpool without trans-shipment by rail when the St. Lawrence Deep Seaway is built. Below the harbor photo is a diagram of the St. Lawrence as it stands at present. Montreal is but 183 miles of river from Lake Ontario. The construction of from 7 to 9 locks would enable deep-draft vessels, both ocean and lake, to pass freely. Only 27 miles of canal building will be required.

A STAGGERING appropriation of almost two billion dollars may be made soon by our Uncle Samuel for the building of two urgently needed, gigantic canal projects. They are to connect the most strategic commercial waterways in the world. Both plans have immense international interest.

Number one, known as the Nicaraguan canal project, proposes to construct a canal that will make a seaway clear across the little republic of Nicaragua.

Plan number two, possibly the most vitally needed and nationally interesting, would extend the sea base of the mid continent of North America so that the 400 harbors of the Great Lakes, world famous for the enormous tonnage they handle so efficiently, would actually become seaports,

Huge Territory, Rich in Resources, to be Tapped by Canal Projects



The Riker Mississippi Spillway Plan, now being agitated in Washington, contemplates the construction of a deep concrete lined canal from the Gulf to Cairo, Ill. All flood troubles upon the Father of Waters will be relieved. A wealth of traffic will flow to Cairo, available to sea vessels. At left is Mr. Riker, sponsor of the plan.

available to all ocean carriers. This is the building of the St. Lawrence-Great Lakes Deep Seaway, which would make the ports of the Great Lakes doubly valuable as carriers of America's vast inland commerce and simultaneously as world channels of trade.

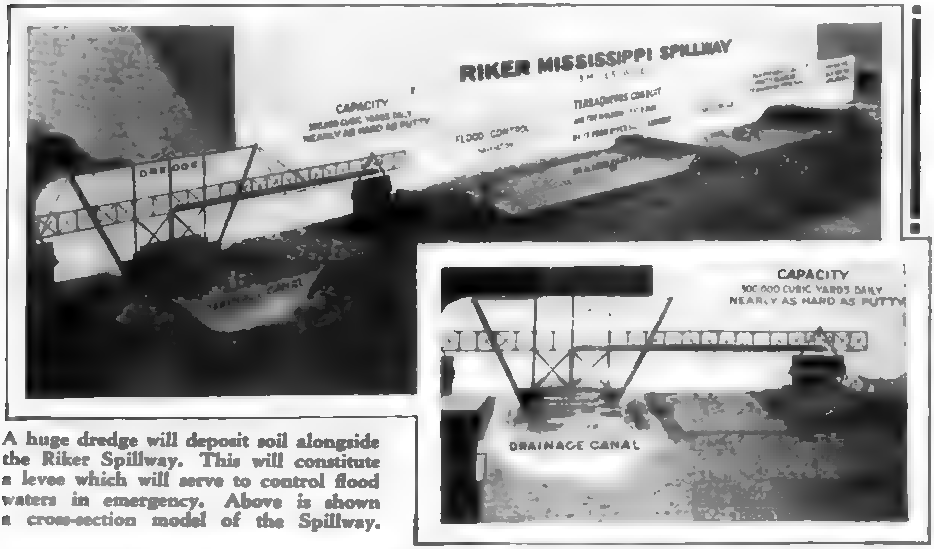
A third project, receiving favorable national approbation, is known as the Riker Spillway, of which more later.

The United States' present keen interest in the proposed Nicaraguan Canal arises from the surprising fact that the far-famed Panama Canal has not lived up to its much advertised expectations. During the last six years its commerce has doubled, and is now close to its capacity tonnage of 50,000,000 tons per year, so that there is every indication that the canal will shortly be unable to take care of its traffic requirements.

All of which means, of course, that our government must act immediately to remedy the alarming situation.

We are accustomed to think of the Panama Canal in terms of great size. But its distance from coast to coast is 134 miles shy of that which would prevail in the case of the Nicaraguan Canal. Moreover, the estimated cost (not yet accepted as official) for the new canal, is close to a billion dollars, as compared with $386,000,000 for the Panama Canal.

This great expenditure, however, would be well worth while, advocates of the Nicaraguan project believe. They say it would save a day's sailing time from New York to San Francisco and about two days from New Orleans to the Golden Gate—in other words, that the canal would afford great economic advantages as a shorter route between the Atlantic and Pacific coasts of the United States, and also between the Gulf and Pacific ports. Furthermore, it would offer splendid prospects for development of a more profitable trade with

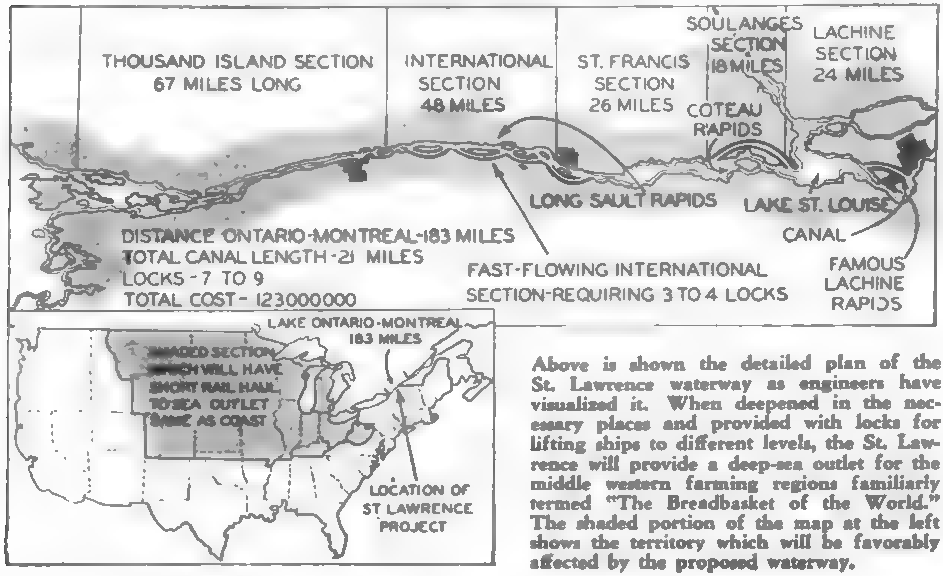


A huge dredge will deposit soil alongside the Riker Spillway. This will constitute a levee which will serve to control flood waters in emergency. Above is shown a cross-section model of the Spillway.

Central America. The canal, in fact, would permit a shortened schedule for nearly 80 per cent of the shipping which now goes through the Panama Canal.

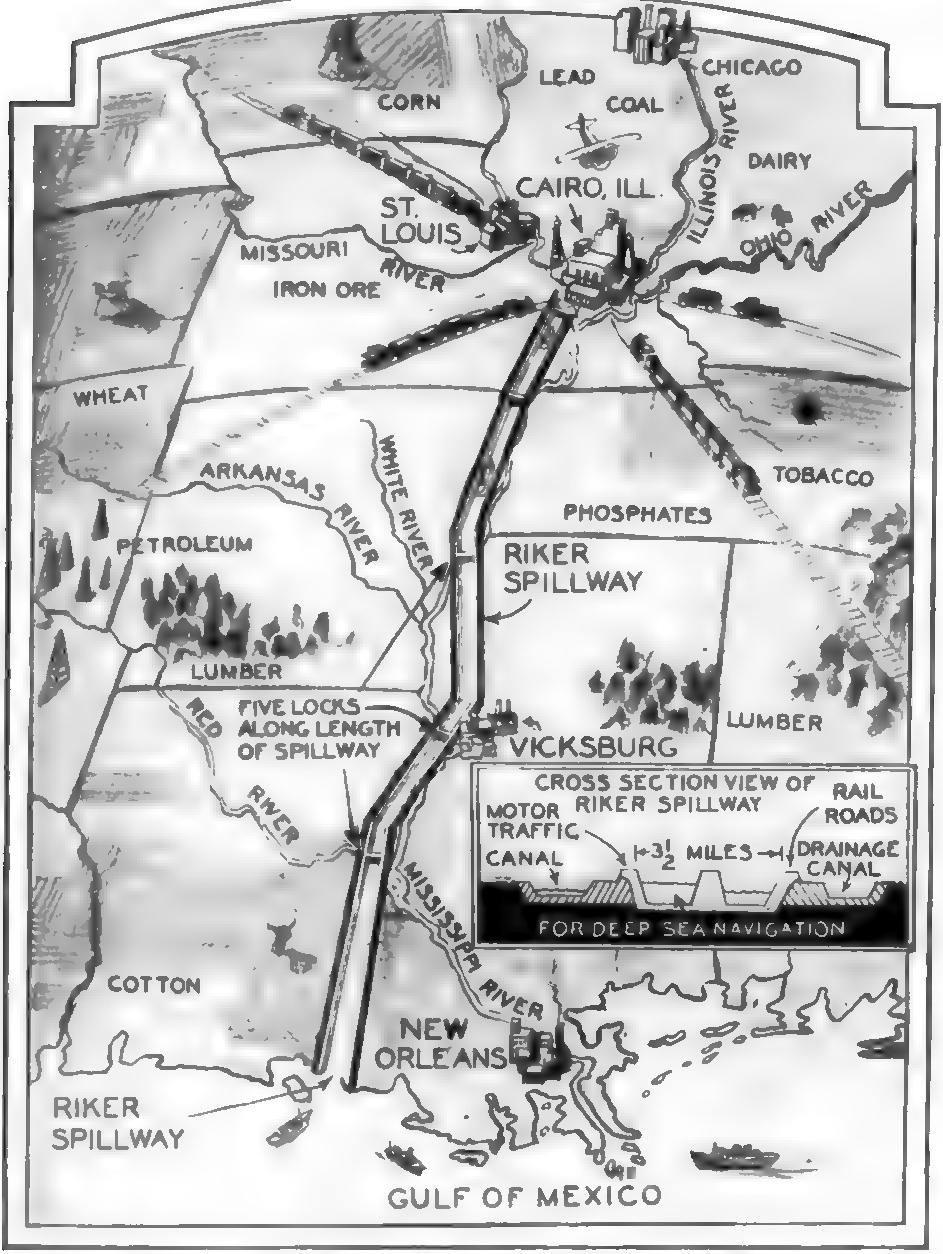
From the strictly military point of view it has been pointed out by both Army and Navy experts that such a new waterway (see map) could be effectively defended and would give our naval and merchant fleets the insurance of *two* means of passage from ocean to ocean.

Curiously enough, the idea for the Nicaraguan Canal turns back the pages of American history 40 years, long before the Panama Canal came into being. It was in 1889 that Congress granted a charter to the Maritime Canal Company for the furtherance of such a project, though it fell



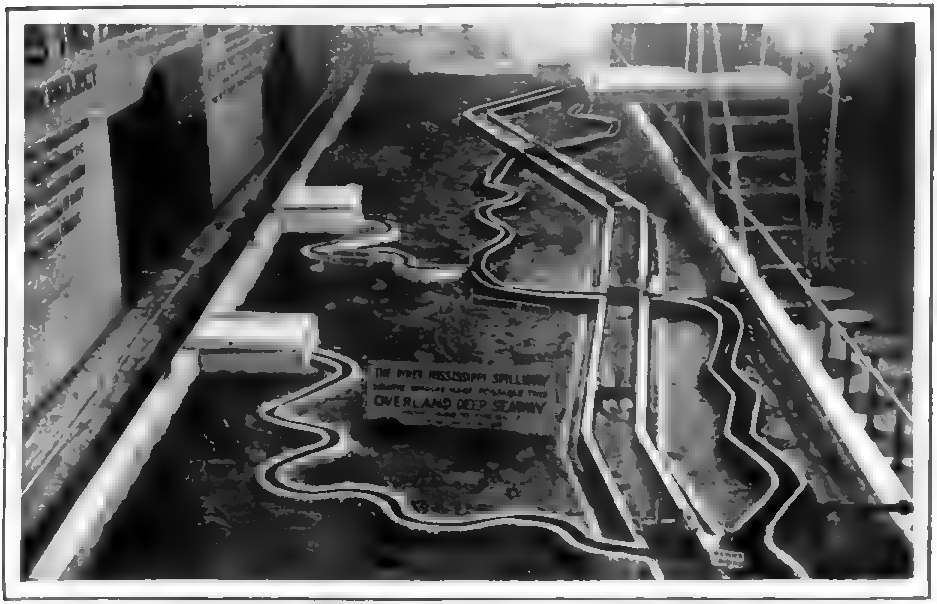
Above is shown the detailed plan of the St. Lawrence waterway as engineers have visualized it. When deepened in the necessary places and provided with locks for lifting ships to different levels, the St. Lawrence will provide a deep-sea outlet for the middle western farming regions familiarly termed "The Breadbasket of the World." The shaded portion of the map at the left shows the territory which will be favorably affected by the proposed waterway.

Spillway to Control Floods Will Bring Ocean Liners to Cairo, Illinois



Among the pending plans for moving the ocean inland so that a direct sea outlet is available to the portion of America which produces most of the nation's raw material, the Riker Spillway is forging to the fore. Primarily it is a project for meeting with the flood problem on the Mississippi. It is designed to carry a portion of the waters of the Mississippi, allowing ocean vessels to penetrate as far as Cairo, Ill.

This Working Model of Spillway Shows Senators How the Plan Works



Cutting up through the Chafalya Basin, the Terras Basin, and the Yazoo Basin from a point 150 miles west of the mouth of the Mississippi, the Riker Spillway, shown here in model, would contain five locks which would permit ocean liners to make their way to Cairo, Ill., which is the geographical center of the United States. The drawing to the left exhibits the plan graphically, showing the raw products which might make their way directly to the sea.

through at that time due to pressure on the part of certain South American interests. The first really practical step for the canal's realization was paved back in 1914 during President Wilson's regime when there was signed at Washington a special treaty between Nicaragua and the United States. This country paid $3,000,000 for "the exclusive proprietary rights for the construction and operation of an interoceanic canal by a Nicaraguan route . . . whenever the construction of such canal shall be deemed by the United States as conducive to the interests of the two governments." The World War cut short American development plans.

Concerning today's situation—it is true that thus far Congress hasn't appropriated much money for a thorough investigation of the proposal. The sum of $150,000, granted for the purpose of a survey last March under ex-President Coolidge, is a mere drop in the bucket. Nevertheless many government engineering experts confidently expect that President Hoover with his broad knowledge of national needs will soon see to it that the canal gets a start on a worth-while scale.

National interest in a shipway of sufficient depth to permit ocean shipping from the Great Lakes to the Atlantic Ocean has been widespread for 9 years. Midwestern industrialists and the 40,000,000 inhabitants of the world's bread basket are clamoring for its completion.

In 1920 an international board of engineers was appointed by Canada and the United States to make a survey of the St. Lawrence from Montreal to Lake Ontario in order to discover how best to make the waterway navigable for ocean and lake vessels. In 1921 the experts made a favorable report and in 1924 the two governments appointed another board of engineers to review the earlier board's report. In 1926 the new board's report showed the engineering factors to be very acceptable to both governments.

Also in 1924 the two governments appointed advisory committees to further investigate the *economic* phases. President

(Continued on page 185)

Swedish Clock Tells Time of Cities Anywhere on Globe

THE exact time, day or night, in any country in the world can be determined by a glance at this clock shown at left. It is displayed in a hotel in Stockholm, Sweden, and enables tourists and visitors to ascertain the correct time in any foreign place they desire. It is operated electrically and has ten hands. Each hand is labeled distinctly so that the different systems of various countries will not be confused. A mail schedule is posted at the side of the clock. The face represents a world map.

First Girl to Tour World by Auto

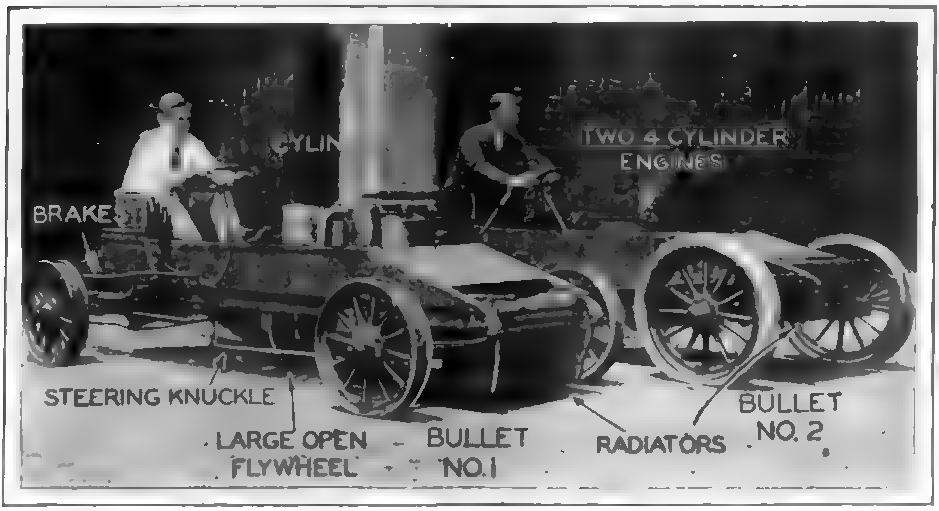
FRAULEIN Clairenore Stinnes, daughter of the late German steel magnate, claims to be the first girl to attempt a round-the-world tour by automobile. She started her trip from Berlin, Germany, in May, 1927, and is now winding up the last lap of her journey. The photo shown below was taken when she was recently in Los Angeles. After touring countries in the eastern hemisphere, her car was shipped to America.

Hangs By Feet to Fix Strut

HANGING by his toes from a hole cut in the bottom of the fuselage of his five-passenger plane, Lieutenant Carl A. Dixon, Hartford aviator, went about fixing a broken landing gear as his mechanic guided the ship. The gear was repaired with rope and wire, and after crawling back and taking over the controls himself, Dixon brought the ship to a perfect landing and his three passengers alighted safely. When he noticed that the right V-strut of the landing gear had become disconnected and was hanging limply, he stripped to the waist and coolly began his hazardous job.

Miss Stinnes shown with C. A. Soderstrom, famous sportsman, when she stopped in Los Angeles, Cal.

First Racing Cars Are Put on Exhibition in Washington



WHEN the largest throng of spectators that has ever watched an automobile speed race recently gathered at the Indianapolis Speedway for the 500 mile classic, the marvelous performances displayed by the various cars and drivers marked a period of less than 30 years since the first racer roared down the beach at Daytona, Fla., faster than a mile a minute. That car, known as "Bullet No. 1," is shown with a later model, "Bullet No. 2," in the photo above.

They have recently been placed on exhibition in the Smithsonian Institute in Washington. The first car was powered by a 4-cylinder motor with a 6-inch bore and a 7-inch stroke. It made a mile in 51 seconds, and was regarded as the fastest vehicle in existence at that time. It was built in 1901.

Its successor, "Bullet No. 2," was the initial straight-eight racing car. Two 4-cylinder engines were hooked up in tandem with a bore of five and one-fourth inches and a stroke of seven. It attained a speed of 106 m.p.h. in 1905. Members of the museum staff are shown occupying the seats of the old racers.

New Barges on Upper Mississippi

CARRYING commodities from New Orleans to the head of Mississippi river navigation at St. Paul and Minneapolis, Minn., 2,000-ton capacity barges made their initial trip recently when they left 17 carloads of sugar at Dubuque, Iowa.

Wins Family Fishing Honors

WHEN Jeanette Johnson's father went fishing recently she wanted to go, too. Given a pole so that she would not interfere with his angling, the little girl caught an 11-pound flounder, which is exactly one-third of her weight. Her call for help when the fish took the line brought her father.

11-pound flounder bit on hook of tiny angler.

PATENTS

Forty thousand patents are issued by the U. S. Patent Office every year. Of this number perhaps 500 are commercially successful. We leave it to you to decide from the pictures which of the patents on these pages stand the best chance of making money for inventors.

Death's Head Clock Is Warning to Late Homecoming Husbands

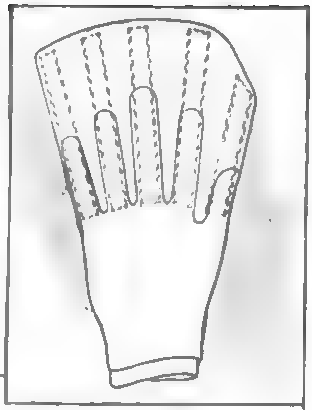
IMAGINE one's embarrassment on tiptoeing upstairs after a late poker session, to be confronted by a death's head clock like that shown in the picture above ringing out the dreary hour of 2 a. m. It's enough to shock a man back into the straight and narrow path. Maybe that was the purpose the inventor had in mind when he patented the timepiece. Just how many customers he will find for his invention is another question. The clock might be appropriate for a doctor's office or an undertaker's parlor, and the design would make a fitting wrist watch for human flies, race car drivers, and the chap who rocks the boat. If the clock design proves popular, the inventor will no doubt bring out a grandfather's clock model using a full length skeleton.

Three Drinkers Use the Same Glass With Novel Sanitary Divisions

THE latest wrinkle in sanitary drinking cups is the three-compartment model pictured below which provides a separate rim of glass for each person to drink from. A raised hump of glass keeps each drinker's lips from sliding over the ridge onto alien territory, and thus the germs from each individual's mouth are concentrated on his section of the glass for his own personal use. The germs must of course be trained not to fall off the edge of the glass, since the danger of drowning in the liquid contents is great. If you would like a dozen of these glasses, the inventor who has just patented the design will no doubt be glad to receive your order.

Three private drinking sections are provided on the rim of this recently patented sanitary glass.

Nutty or Novel

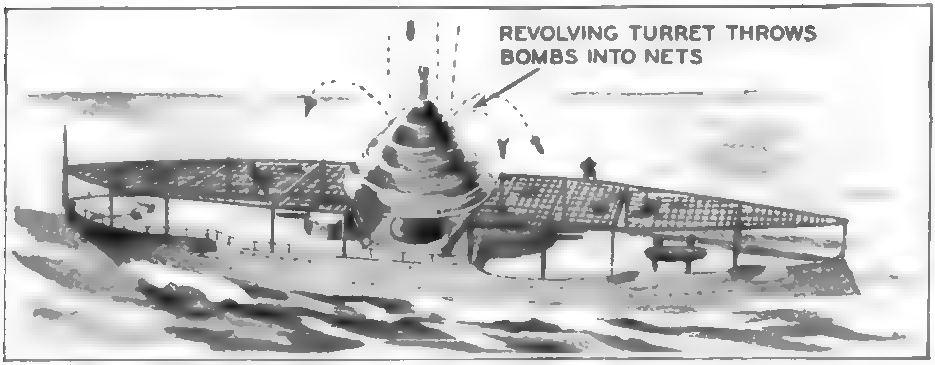


Webbed Glove Gives Speed to Swimmers

BEGINNERS in the art of swimming will find the newly patented water glove, shown at right, a welcome aid to progress. It is even possible that expert swimmers will find that the gloves increase their speed. The device consists of stiff ribs projecting along the fingers, jointed together with a fabric which has the effect of making the human hand webbed like a duck's foot. The paddle-like effect thus gained increases the pulling power of the arm strokes. The area which the gloves present to the water is considerably greater than that of the hands alone, and the effect is something like that of a paddlewheel steamer. The inventor of these swimming gloves ought to be able to cash in on his patent by selling them to channel swimmers out to set new records.

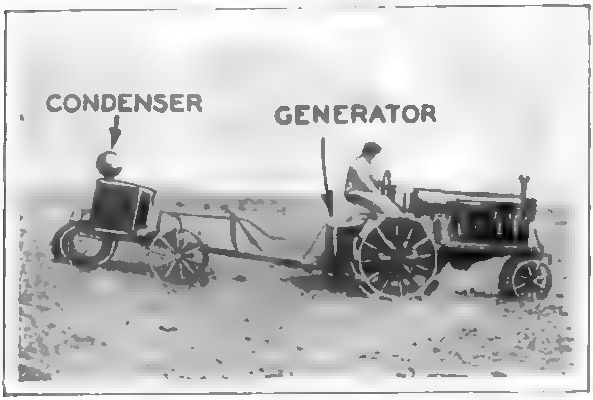
This Battleship Turret Tosses Enemy Shells Harmlessly Into Sea

NAVIES won't have any fun playing war with each other any more if the protecting battleship turret shown below comes into general favor. The idea of the inventor seems to be that a huge cone, if revolved fast enough, will catch any bombs that drop on it and toss them overboard before they get a chance to explode and annoy the fighting gobs. Netting stretched over the decks will retrieve shells not tossed overside and they can be used to fire right back at the enemy. If you're skeptical as to the efficiency of this device, remember that Uncle Sam has issued a patent on it giving its inventor the sole right to manufacture and sell it. Think how heartsick enemy gunners will be when their well-directed shots bounce off the protected battleship like split peas from a brick wall. It takes all the sport out of the game of war, and the worst of it is there will be no way of telling who has won the battle when both ships are protected by turrets and neither can send the other to the bottom.



Shells from enemy siege guns are supposed to bounce off this rapidly revolving battleship turret.

Fertilize the Largest Farm in Illinois With Electricity



CHARGING the soil with electricity as it is being plowed is the newest form of fertilization. The largest farm in Illinois, 13,645 acres in a single tract, is treated in this manner. The plow and apparatus used are shown at left. In addition to bringing an improved yield of crops the electric current kills harmful insects and weeds as it flows through the soil. The generator is placed underneath the driver's seat of the tractor hauling the plow. Current is carried to the plow shares and thence to the soil. During spring plowing, a careful record was kept of the cost of operation of the new plow as compared with other methods. A comparison will also be made of adjacent fields of the same soil quality.

This will afford the exact degree of difference between the two methods of fertilizing soil, and will also give farmers an idea of the cost of operation of an electrical plow. State agricultural authorities are awaiting this comparison with interest.

Landing Without Sighting Ground

A PERFECTED radio beacon marking the axis of a flying field in a dense fog, together with an extremely accurate altimeter, will enable a pilot to land a plane without sighting the ground, according to Lieutenant Jimmy Doolittle, one of the aviators of the Guggenheim Foundation working on this problem. Extensive research has been made along this line in an endeavor to eliminate the fog problems.

Sunburn Is "Made to Order" for Customers by Portrait Photographer

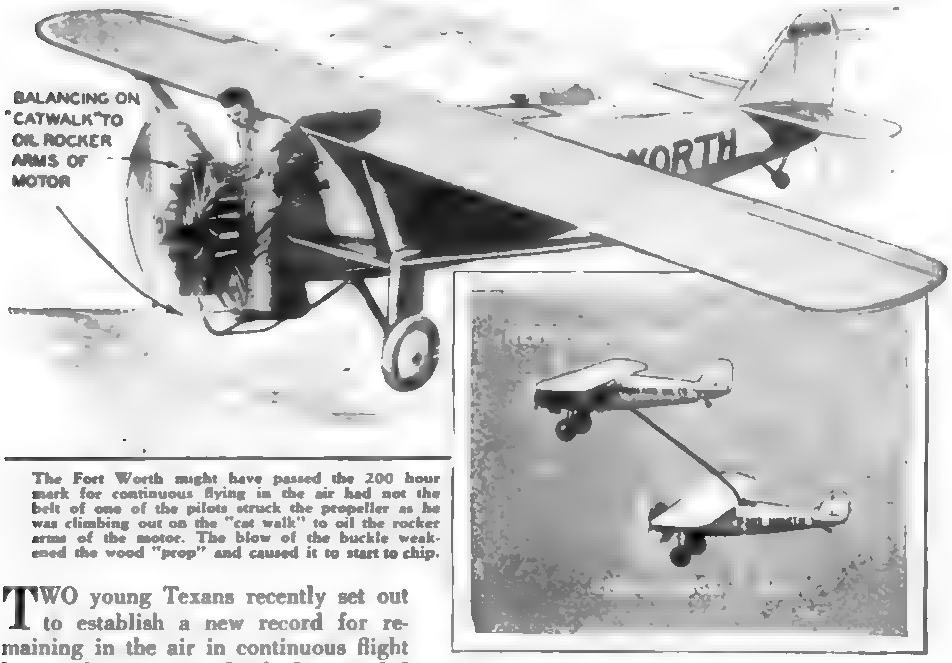
IF A person desires to appear in a portrait with a healthy glow of tan, Preston Duncan, Hollywood photographer, satisfies that desire by using a special lamp that sheds a golden ray of sunburn over the subject when the picture is being taken. The ray is produced so that it registers perfectly on the negative. The color is contained in the glass plate through which the light is shown.

By intensifying the power of the lamp, genuine sunburn may be derived in about 30 minutes. A burn of similar nature would require several hours on the beach under the hot sun.

Fashion has decreed that this season's smartest tone in complexions is the sunburn shade. Duncan therefore devised the lamp so that screen beauties who want the fashionable tan to be apparent in their portraits may be accommodated without actually being burned. Those who wish a quick sunburn merely request that the power be turned on.

Billie Patterson getting a photographic sunburn.

Breaking the Endurance Flight Record



The Fort Worth might have passed the 200 hour mark for continuous flying in the air had not the belt of one of the pilots struck the propeller as he was climbing out on the "cat walk" to oil the rocker arms of the motor. The blow of the buckle weakened the wood "prop" and caused it to start to chip.

TWO young Texans recently set out to establish a new record for remaining in the air in continuous flight longer than anyone else had succeeded in doing. A few months before, the United States army plane, *Question Mark*, stayed aloft for 150 hours, and 40 minutes—more than five days! The youths, "Reg" Robbins and James Kelly, made a few trial refuels in their Ryan monoplane, the *Fort Worth*, and then declared themselves ready for the grueling test. They left Meacham airport at Fort Worth, Texas, on May 20 and remained in the air for more than seven days —172 hours! Refuels of gasoline were made at regular intervals, and the pilots took turns at the controls while one slept. One of the unusual feats which they accomplished was the method used in oiling the rocker arms of the motor. A metal "cat walk" frame built on the plane beneath the engine aided them in this.

"Speed" Holman Wins Annual Gardner Cup Plane Race

BESTING his nearest opponent by more than 25 minutes, Charles W. "Speed" Holman, St. Paul pilot, recently took the annual Gardner trophy airplane race in an average time of 156 m.p.h. from Parks Airport in St. Louis to Indianapolis and back again. His time was tabulated at 2 hours, 58 minutes and 40 seconds. In addition to the huge cup which is being presented to him in the photo at left, he also won a $5,500 purse and $750 on the previous day as winner of his heat. The races the day before the final, cut the entrants down to nine. No motors with more than an 800 cubic inch displacement were allowed. Holman flew a Whirlwind powered Laird. He is one of MODERN MECHANICS' contributing editors and is at present Manager of Operations of the Northwest Airways, Inc., St. Paul, Minn.

"Speed" Holman also holds the world's loop-the-loop record with almost 1100 continuous loops in a single flight. He stands six feet four inches high and weighs more than 200 pounds.

Start "Yellow Bird" With Cable

THE "Yellow Bird," trans-Atlantic French plane that recently made a flight from New York to Spain, is shown below as the huge propeller was being started in preparation for taking off on the journey. The ship is a huge Bernard monoplane powered by a 12-cylinder Hispano Suiza motor. The engine is started by attendants pulling on a cable that is attached to a leather cap fitting over the end of the propeller.

The French plane, "Yellow Bird," uses the means shown above of starting the huge motor.

This Golf Ball Gun Releases Supply at Pressure of Button

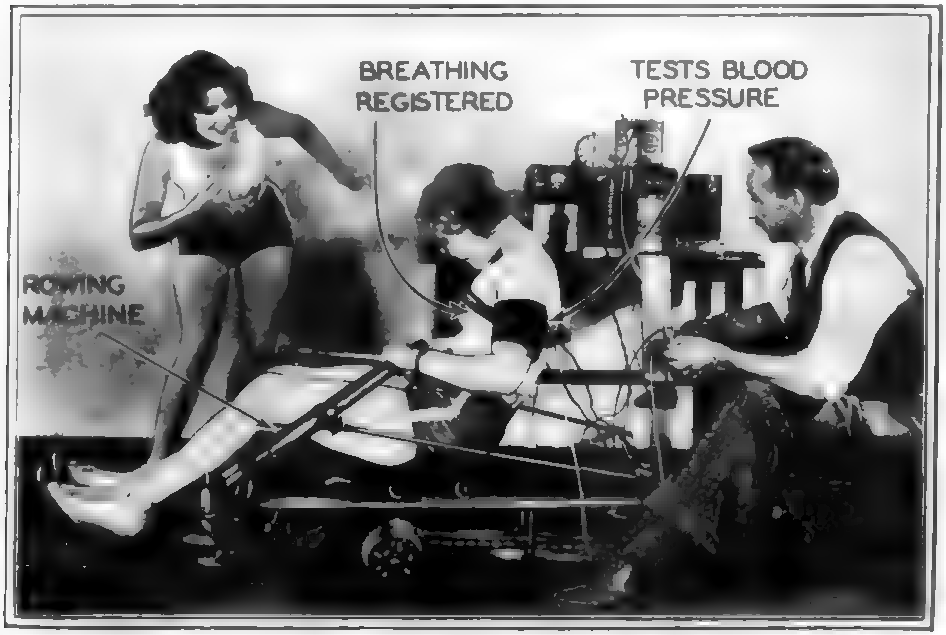
ELIMINATING the necessity of turning a golf bag upside down or fumbling around with the ball pocket on the side of a bag, this golf ball gun shown at right contains 12 balls and operates easily and quickly. It is attachable to either the inside or outside of the bag and works by the mere pressure of a spring-catch that releases a ball from the socket. Use of this tube makes it an easy matter to find a ball when it is wanted. Some players keep two of these guns—one for old balls and one for new.

Why Gentlemen Prefer Blondes

IF THE much discussed statement that "gentlemen prefer blondes" is true, then perhaps it is because they are steadier workers. At least, that is what a recent test made with movie stars as subjects tends to show. In a comparative series of tests with this apparatus shown below, blondes far surpassed brunettes. While exercising on a rowing machine, their breathing and blood pressure were compared. A highly sensitive air tube placed around each girl's chest recorded the regularity of breathing. Blood pressure was tested on the left arm.

Boiling Lake Sets Fire to Logs

A LARGE lagoon near the city of Yora in Honduras, South America, recently started to fill with boiling water after having been dry for many years. The heat in the lake bed, not yet inundated, was so intense that logs thrown into the water have been consumed and clouds of smoke hover above the lake. Technical experts have been sent out to ascertain the cause.

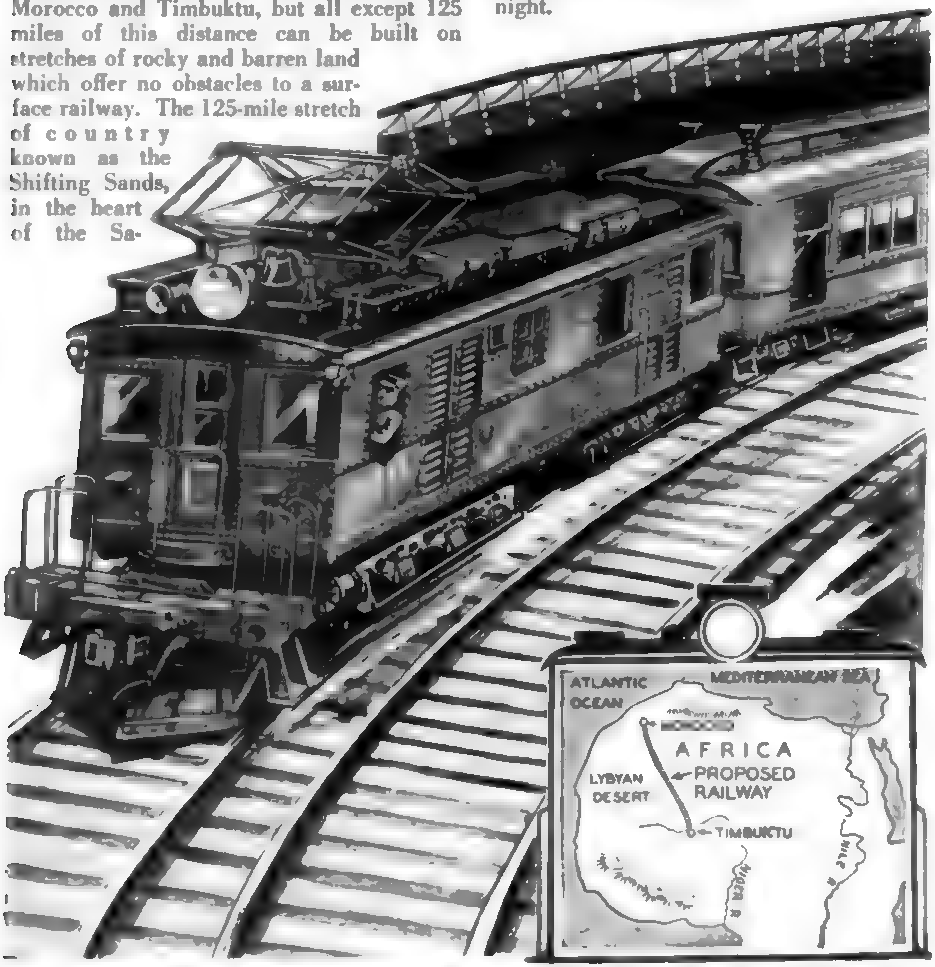


Brunette Raquel Torres and Blonde Anita Page, stars, are shown being given the comparative test.

A Subway Through

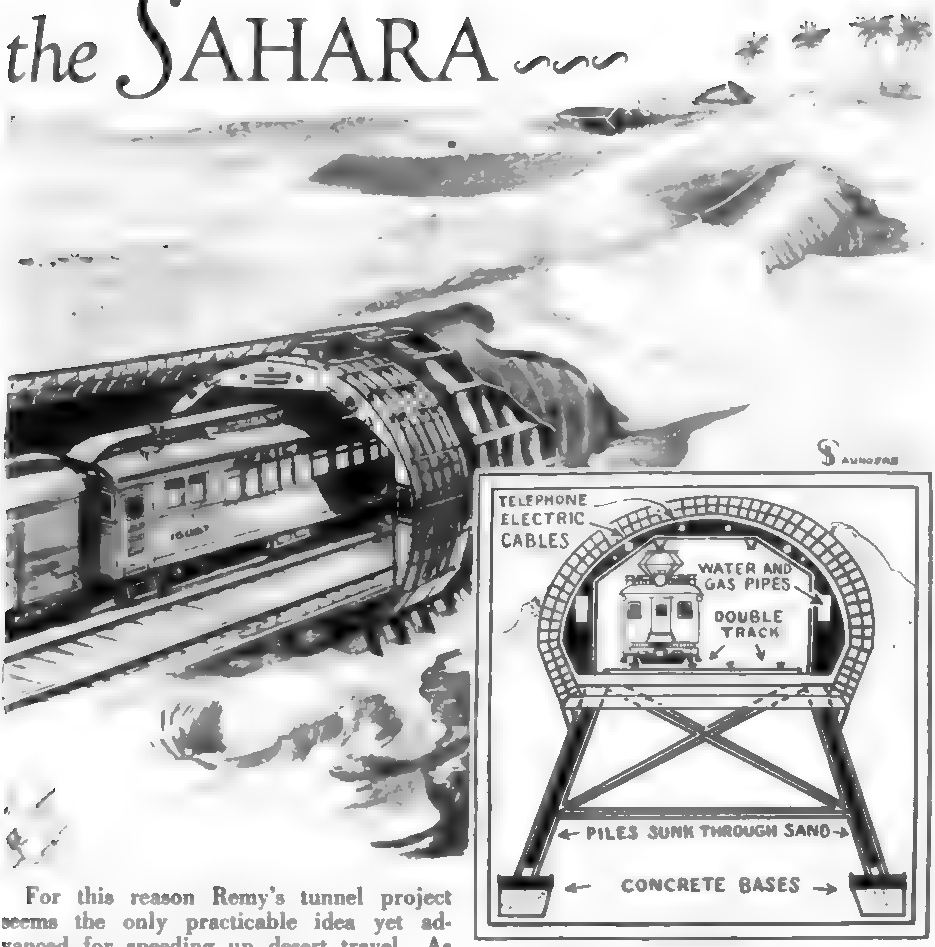
A tunnel railway beneath the shifting Sahara desert sands of northern Africa, covering the thousand miles between Morocco and Timbuktu, is proposed by a French engineer as a solution of desert travel.

COINCIDENT with the project of a tunnel under the English channel to connect France and England, a French engineer, Paul Remy, has conceived the idea of a 125-mile subway through the Sahara desert in northern Africa. The route of the railway would cover the 1000 miles between Morocco and Timbuktu, but all except 125 miles of this distance can be built on stretches of rocky and barren land which offer no obstacles to a surface railway. The 125-mile stretch of country known as the Shifting Sands, in the heart of the Sahara, is filled with sand dunes which blow up overnight to tremendous heights, only to disappear on their endless march where the hot winds bore through them and urge them onward. Surface rails, of course, would be impossible in this land where mountains of wind-blown sand would cover them overnight.



The map printed above shows a proposed route of trans-Saharan railway tunnel. From Morocco to Timbuktu the distance is just over 1000 miles, but the tunnel would only be necessary for a stretch of 125 miles in the middle point of the distance. The remaining tracks would be built regularly.

the SAHARA



Observe how the supporting piles of the tunnel are sunk deeply in the sand, resting on spread-out bases. Telephone and electric cables run inside the shell of the tunnel.

For this reason Remy's tunnel project seems the only practicable idea yet advanced for speeding up desert travel. As proposed, the tunnel would be a huge metal tube supported on a skeleton viaduct of cross-ties and piles sunk into the sand.

It would be a simple task to construct pipe lines through the shell of the tube so that water, gas, electric cables and telephone lines could be run through them. Power for the trains would naturally be electric, since it would be impossible to use coal or oil-burning locomotives because of the ventilation problems involved.

In time the desert sands would submerge the tunnel entirely, insulating it from the intense heat so that travel would be far more comfortable inside the tunnel than upon the surface. Were it not for the fact that there is no water available, it would be possible to plant grasses in the sands and anchor them with plant growth so that they could not shift overnight. As it is, however, the tunnel seems to be the only possible means of bridging the heart of the desert.

Fantastic as such a scheme sounds at first, and high as would be the initial cost, no other entirely satisfactory method of rapidly crossing the shifting sand area has been offered. For both economic and military reasons France is determined to build a railway across the Sahara. Some means of rapid transport of troops in case of a national emergency, is very desirable.

Special Foot Pads Aid Pet Dog in Walking Tight Wires

BALANCED sprightly on tight-rope wires, Bingo, pet dog of a man in New York, amuses himself and his master with daring performances that are really remarkable. In order that the taut wires do not cut into the paws of the dog, he wears specially prepared pads on his feet, enabling him to retain his balance safely.

It is difficult enough for an experienced human tight-rope walker to "be at home" on a single wire, but whenever Bingo takes a stroll on a rope, it is necessary for him to watch two wires. The dog learned the art of walking tight wires very aptly, and after the first few trials grew to enjoy it a great deal. His owner has rigged up some wires for him to practise on in the back yard.

Discover Gold in Philippines

GOLD deposits valued between $20,000,000 and $50,000,000 have been discovered in the Philippine islands near Manila by workmen constructing a tunnel for the metropolitan water districts. Claims have been filed by 19 Americans, members or employes of the engineering concern on the job. Philippine laws provide that only one claim can be made by an individual. The superintendent, who discovered the deposit, therefore favored his friends and coworkers by staking the remainder of the vein in their names.

Huge Watch Attracts Attention

WEIGHING 200 pounds, this watch shown at right is declared to be the largest in the world. It was recently displayed in a jeweler's window in Portland, Me., and has attracted considerable attention from many shoppers. Work on the watch was begun three years ago, and it has finally been completed at cost of $10,000. It has 17 jewels and stands about 3½ feet high. On exhibition in the window with watches of standard make and size the contrast provided was extremely striking. Every part is enlarged exactly to scale, and the watch keeps perfect time.

When shipment was made to the jeweler, it was necessary to use a block and tackle to place the giant watch in the show window. The plate glass had to be removed.

Flyer Breaks Arm in Stair Fall

CAPTAIN ALBERT W. STEVENS, crack U. S. Army aerial photographer, has flown as high as 38,000 feet in his plane on many occasions without a mishap. But fate took a hand in his affairs recently. While walking down stairs carrying a large aerial camera, he fell and broke his right arm. His attempt to save the camera caused him to be injured.

Comparison in size of two watches of same make.

Stencil Is Used to Tan Name or Initials on Bathers' Skin

FAIR bathers may initial their skin this summer with a "paint" that only time will erase, if they so desire. Stencils, in which the name or initials of the owner are cut, are held or taped on the skin. The stencil is easily made from a piece of cardboard or similar material. The photos at right and below show Raquel Torres, M-G-M motion picture star, tanning her name on her skin.

Robots Answer All Questions

HOW England's mechanical men work was recently explained. A youngster wishing to know the location of a restaurant sees one of the mechanical men on a street corner. Approaching him, he presses a button on his tummy. Almost instantly lights stare from under the steel man's heavy eyebrows and a deep voice booms out, "What do you want to know?"

The youth startled, stutters, "Ppplease, where can I find a restaurant?"

"Three blocks and turn to your right," the answer comes.

Bewildered, the boy follows directions and, sure enough, walks straight into a restaurant.

What has happened is this: When the youth pushed the button on the man's stomach a light showed in front of a man in a control room some distance away. He immediately "plugged in" on the steel man from which the signal came. Conversation was possible by a microphone connection.

U. S. Flyer Hopes to Make 340 M. P. H.

MECHANICS are working on a strange appearing plane, tearing it down from a biplane to a monoplane, at the naval aircraft factory in Philadelphia. The workroom is closely guarded and none may pass in or out without special permission. All the secrecy involved lies in the fact that the mystery craft is that of Lieut. Al Williams of the United States Navy, and that it is being groomed for the Schneider Cup race September 6 and 7 as the American entry.

Lieutenant Williams, one of the most daring flyers in the service, has remarked to friends that unless the plane tunes up the 340 m.p.h., he will not enter the race. Three hundred and forty miles an hour—nearly six miles a minute—an almost incredible speed!

And Lieutenant Williams had good reason for his remark for reports from Italy state that country's entry has already tested close to 350 m.p.h. However, this does not mean that the fastest plane will win, but that the ship that will be able to stand up longest under the terrific strain will be the victor.

The mystery plane is powered by a Packard X type engine of 24 cylinders, developing 1,200 h.p. When it is completed, there will be scarcely enough room for the pilot.

MOUNTAINS of

Twice as large as any building now standing, designed to cover two city blocks and to contain 4,000,000 square feet of floor space—such are the dimensions of Chicago's new Merchandise Mart. New York, also, is erecting two new giant skyscrapers.

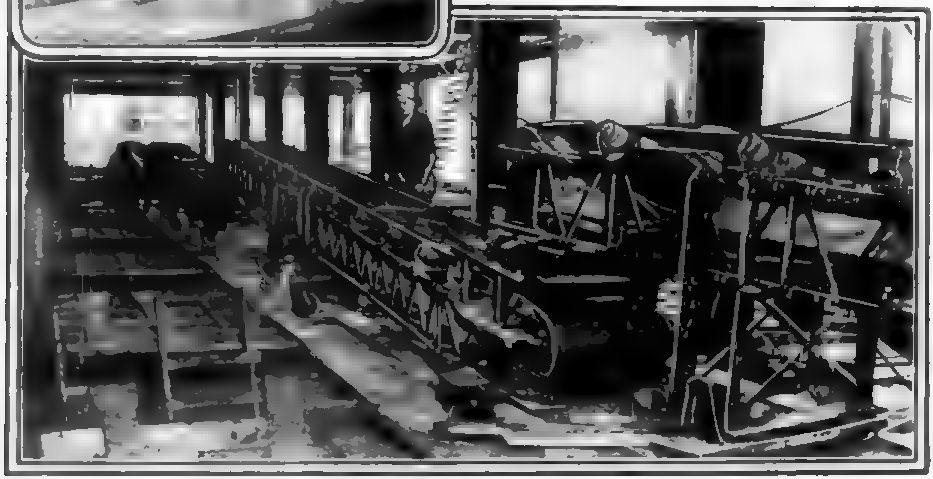
THE world's largest building, the Merchandise Mart, under construction in Chicago, is a project which staggers the imagination. It is actually double the size of any building now standing. It will contain 4,000,000 square feet of space, twice that of any other. It will occupy two entire city blocks and will be 18 stories high overall, with a six story tower additional, making it 24 stories at the top.

Not only in size is it interesting. The engineering and mechanical departures involved also are many. For one thing this colossus of market places is an air rights development. That is, the building is built directly over the tracks of the Chicago and Northwestern Railroad, put up on stilts, as it were, and the trains will continue to run beneath the building, bringing freight directly into the basement of the huge edifice.

Building Built Beside River

Also it will have its own docks, as it is located on the bank of the Chicago river, and ships can discharge their cargo almost into the basement of the building.

The building is designed to house many merchandise firms, all of whom will dis-



Fifty thousand tons of steel will be used in fabricating the skeleton of the new Merchandise Mart. Top photo shows a number of huge girders piled up ready for use. The lower picture shows the automatic concrete conveyors which do away with the familiar wheelbarrow in transporting concrete.

Brick and Glass

Tons of Brick and Concrete Form Shell of the World's Largest Buildings

Note how the new Merchandise Mart will dominate Chicago's downtown district, as shown in the above bird's-eye view. The architect's drawing of the finished building, at the left, gives an idea of what the Merchandise Mart will look like.

play their wares together for out-of-town buyers. Marshall Field & Co., the great Chicago department store, sponsors the project and will be the largest tenant.

To build this structure above the railway tracks it was necessary to sink 458 reinforced concrete caissons, extending from 80 to 100 feet below street level. Another novel engineering feature is the fact that these caissons are spread at the bottom.

More than 50,000 tons of steel will be used in construction of the building. It will have 5,500 windows, requiring 132,000 square feet of glass. There will be also more than six miles of plate glass used for display windows in the corridors.

To light the building 30,000 lighting fixtures will be required, necessitating the use of 380 miles of wire.

Many clever mechanical devices were brought into play in the building of such a huge project. For one thing a special boat was designed which pulled up along the site and shot, by means of compressed air, 2,000,000 lbs. of cement from the boat to

Above—The Chrysler building, New York's 879-foot giant to be completed early in 1930. It will cost $14,000,000. In circle—Leroy S. Buffington, of Minneapolis, Minn., inventor of the principle of attaching shelves to a steel skeleton upon which a masonry veneer can be built.

the giant hopper in the mart. This naturally saved thousands of labor hours.

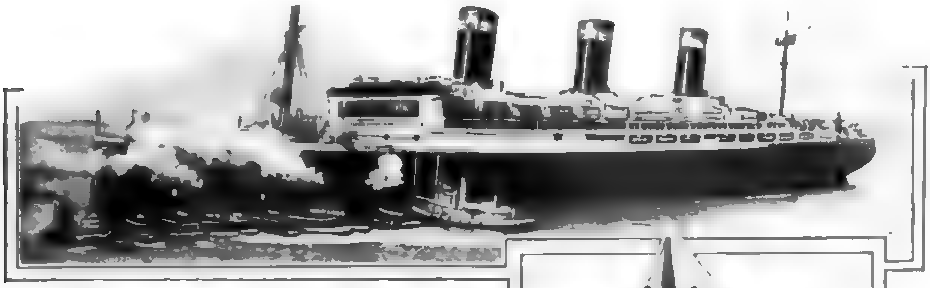
Another labor saving device, which did away with the old wheel barrow in pouring concrete, was a conveyor, automatic, which carried the concrete from one part of the building to another, where it was dumped and used. Underneath the building the railroads will operate a freight station, just to take care of the goods shipped in and out.

Chicago, however, is by no means alone in the erection of huge new buildings. Both the Chrysler building and the Bank of Manhattan building are being built now in New York. The Chrysler building will be 879 feet above street level, and from the observation platform on the top of its 65 stories spectators will be able to view the country for more than 100 miles. The elevators in the building will constitute the highest vertical transportation system in the world. The Bank of Manhattan building will be 840 feet high.

In connection with these newest of skyscrapers, it is interesting to note that the inventor of the principle which makes them possible is only now receiving the first royalties on his patent. He is Leroy S. Buffington, 80-year-old inventor of Minneapolis, Minn., who 48 years ago invented the principle involving a braced skeleton of steel with shelves fastened to the skeleton at each story to support a masonry veneer. Mr. Buffington's patents have long since expired, but he has received a check for $2,250 from Rufus R. Rand, builder of the Rand building in Minneapolis, who believed that the royalty was the just due of Mr. Buffington as the father of the American skyscraper.

The Bank of Manhattan building will lift its 63 stories in the heart of Wall street. It will be 840 feet high and cost $20,000,000.

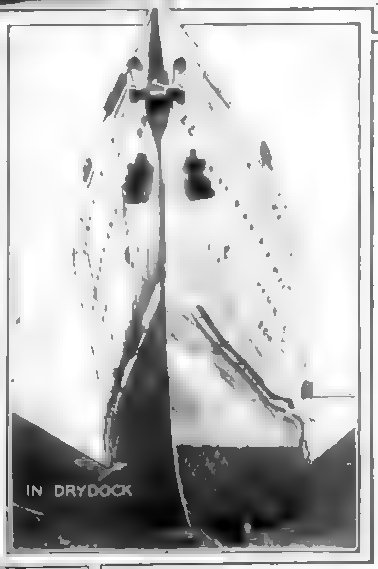
Drydocking LARGEST Liner

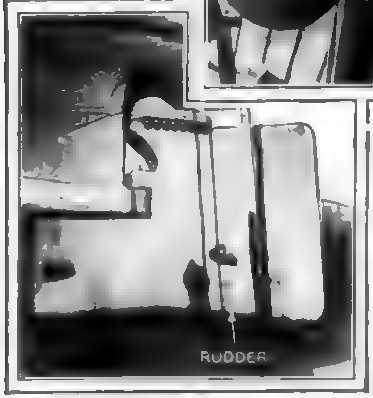


ONLY nine days were allotted workmen in the drydock at South Boston, Mass., to overhaul the *S. S. Leviathan*, the largest ocean liner in the world.

High and dry, the hull of the huge ship was thoroughly gone over and reconditioned. It was completely scraped and repainted for another year's service plowing through angry waves of stormy oceans.

To drydock a boat, it is necessary to run it into a lock similar to those used in a canal. A pattern of the ship's bottom is first made in the lock before it is filled with water. The boat is then maneuvered into the lock and the water let out. "Donkey" engines and tug-boats steer the hull so that it fits on the blocks of the pattern. Workmen are then able to go ahead with the reconditioning.



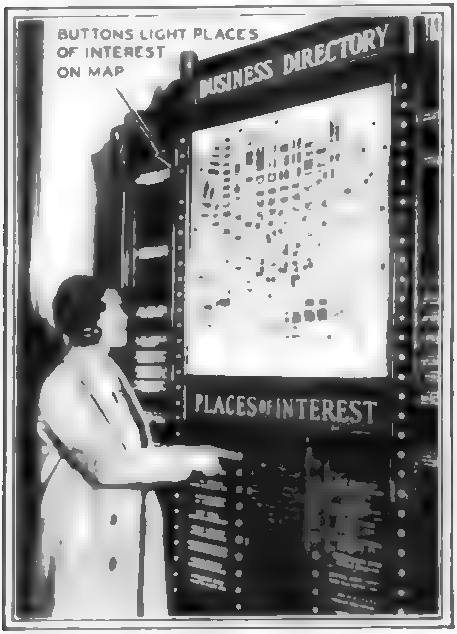


Top photo shows the Leviathan being towed into the drydock lock in preparation for its annual cleaning. A fleet of 15 tug-boats steered the giant ocean liner about the lock before the water was drained.

One of the four monstrous propellers is shown above being worked on. Careful inspection was made of the huge rudder.

Until recently the *Leviathan* was the property of the United States government. On the seventh anniversary of her last sailing as a military transport, however, she was sold to the United States Lines, Inc. An informal ceremony was held aboard the giant liner, and a deed and a check for $4,000,000 were exchanged. Included in this purchase were several other vessels of the U. S. Shipping Board and American Merchant Lines. The *Leviathan* is now the flagship of its new line. The ship carried many American troops to France.

This Electric Map Lights Location of Places of Interest



SHOWING the exact location of a place of interest that a visitor wishes to see, this electrical directory shown at left is used in the lobby of a hotel in Cincinnati, Ohio. Lists of the interesting places to visit in the city are posted on boards on either side and below a glass surfaced map. Adjacent to each name is a small electric button, which, when pushed, lights the location on the map. Tourists may therefore easily find the position of a place they wish to visit and irksome questioning may be avoided. Street names and numbers are also shown when a light illuminates the board.

Science to Ban Baldness, Claim

NO LONGER will man dolefully sing, "Where are the hairs of yester-year?" Bald heads will be banned within a generation. That's not only a prediction, but it's almost a promise, according to the solemn pledge of L. E. McIlvain, secretary of the National Master Barbers' association. Scientific application of methods of preserving the hair is being taught barbers now, the secretary said, and they will be able to massage the head of a patient with special preparations and devices so that loss of hair will be very exceptional.

Expert Will Study Cosmic Rays

AT A height of nearly 50,000 feet, Professor Andre Piccard of Brussels University, Belgium, and an assistant will work closer to the sun than any human being has ever been before. They plan to study the cosmic rays at this vast height in an especially constructed balloon with an enclosed cabin in which to make their observations. Prof. Piccard declares that cosmic rays are the key to atmospheric conditions on earth and that the expected discoveries may lead to general travel in high altitudes.

Novel Use for Old Razor Blades

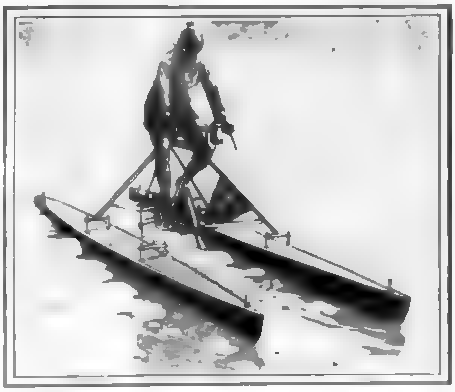
UTILIZING old safety razor blades to cut grass, the inventor of this sickle designed it so that it folds up like a jack knife, thus protecting the sharp edge. The old razor blades are slipped into a groove and tightened by small screws. If one of the blades is damaged in any manner, it can easily be replaced without expense and with little trouble.

In addition to providing a practical use for razor blades that are too dull for shaving, the sickle cuts grass and weeds much more rapidly than one of average make. When ready for use on a lawn, there is no danger that the knife will close on the fingers gripping the handle. It is locked securely by a spring-catch.

This sickle folds up like a jack knife.

Woman Pedals Across English Channel On Aqua-Cycle

CROSSING the rough waters of the English channel in nine hours and 19 minutes on this pontoon aqua-cycle shown at right, Aimee Phsanner, young French woman, displayed remarkable courage and grit during the trip. Boats accompanied her on the journey, which was made from Calles, France, to Dover, England. She received food and water, but otherwise was given no aid. Rising on the crest of a huge wave, her frail craft would dive into a deep billow with a swoop like a swallow. Tired but happy, the young woman landed at Dover midst the cheers of a large crowd.



All Saved as Transport Burns

POINTING the nose of a tri-motored air mail transport toward the inky blackness of an unknown field after one of the motors burst into flames, Chief Pilot Hugh Barker landed the plane and its seven passengers and assistant pilot safely on the desert near Elko, Nevada. One engine of the ship caught fire while the plane was on its westbound trip, and the flames spread to the wings. The giant airplane was up about 2,000 feet, and landing on the desert at night under such conditions not only required plenty of nerve but much ability.

Pig Is Wedding Gift for Lindy

WHEN news of Col. Charles A. Lindbergh's secret marriage to Miss Anne Morrow spread over the country, countless letters and wedding gifts were sent him and his bride. Among the gifts was a pure-bred Poland China pig. One admirer sent a silver wedding ring.

All kinds of advice was freely given in the various letters. Most of them were congratulatory, but some declared that he had made a mistake in marrying—that he'd be "happier single."

This Trained Monkey Spends Most of Time in His Master's Workshop

When attendants want this monkey, they know where to look.

TINKERING with tools has earned this trained monkey at left the title of "house carpenter" on the estate of Cherry Kearten, famous African explorer and authority on animals. The chimpanzee was brought back from Africa after one of his expeditions and tamed and trained. He was allowed to wander about the estate at will and one day walked into Mr. Kearten's workshop. His attendants couldn't find him for a day and a half, and when he was finally discovered, he was busily engaged in nailing small pieces of board around the shop. Now he has a separate corner in the workshop and spends hours with the tools that have been provided for him.

Aviators "Tee Off" in Golf Tournament From Airplane

THE supreme note of novelty in golf was recently struck in the annual tournament of aviators of the American Legion, Post No. 743, when the competing players figuratively "teed off" in an airplane. The tournament, played on the Dunwoodie Country club links, New York, got under way when a plane dropped each player's ball as near to the first hole as possible. The drop counted as a stroke against the players' score and they were required to play the ball from wherever it rolled.

Find Spear With Ancient Bones

DISCOVERY of a stone arrow or a spear point lying directly under the bones of a mastodon was recently made at Melbourne, Fla., by C. P. Singleton, zoologist of Harvard University. This evidence, scientists point out, strengthens the much debated theory that there were human beings in America thousands of years ago when mastodons, mammoths and other pre-historic beasts roamed the country. The weapon could not possibly have been left by Indians at a later date, the discoverer declares, due to the strata in which it was found.

Testing Submarine Safety "Eyes"

EXERTING a pulling capacity of 2,000 tons, this machine shown below tested the strength of the huge steel eyes or loops that are equipped on submarines to attach to pontoon lifting chains in case of an accident. The chains pull the underwater craft to the surface, and must therefore be able to stand the terrific strain.

Government officials inspecting testing device.

"They're Off!"—Thrills of the Turf in Ostrich Racing

FLOWING ostrich plumes once decked the helmets of gallant knights. Later, they were worn prominently on the hats of gay cavaliers. Today the quill feathers of their wings and tails are used principally by women for hats and fashionable apparel. But ostriches are raised in great numbers in Czecho-Slovakia for a purpose other than plucking their feathers for decorations. Ostrich racing is supplanting the usual horse classics of the turf in that country and, according to observers, is far more fascinating and exciting to watch.

The powerful leg muscles of the birds allow them to travel much faster than the fleetest horse. Special saddles that fit tightly around the ostrich's body permit the riders to "stay aboard" when the birds are going at full speed. They are controlled by means of reins and a small bit that fits firmly in the mouth. The birds are trained from birth in knowledge of the track. When full-grown, they stand from six to eight feet high. They are harder to manage than a horse.

Woman Pilots Plane on First Ride as Brother Climbs Out to Fix Strut

A WOMAN who was experiencing her initial airplane ride piloted the craft recently while her brother hung beneath it working desperately to fix a strut that had been damaged in taking off. Observing the disablement of the ship, Lee Hausinger, 23 year old pilot, hurriedly instructed his sister, Mrs. D. A. Jung, in the manipulation of the controls and swung himself out a window. Throwing a rope around the dangling strut, he worked it up an eighth of an inch into its socket and regained his seat at the controls after his sister had carried out his directions almost precisely. He landed the ship almost vertically and knocked the strut well into place again.

Braving Jungle Perils to

By JAMES NEVIN MILLER

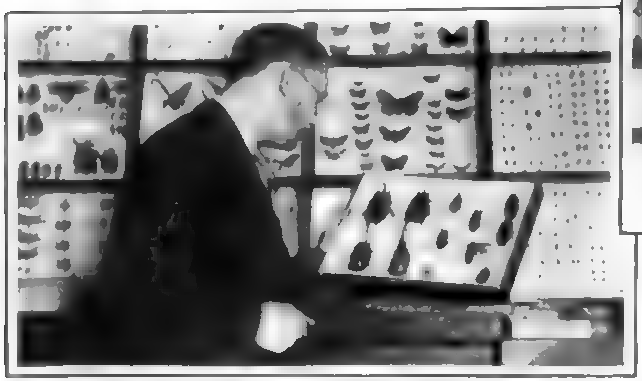
In the heart of the British Guiana jungle there rises a huge plateau upon which, legend has it, there exists today scores of prehistoric reptilian monsters. The story here presented is that of a scientist's thrilling search for the lost plateau.

A STRANGE story about yellow Indians; mice that look like kangaroos; eels able to give a man a substantial electric shock; armies of ants that number millions and march in regular formation for over six hours continuously while driving all animal life before them; rivers chock-full of weird-looking parasites; and waterfalls at least five times higher than our own spectacular Niagara, is told by Dr. S. H. Williams, naturalist of the University of Pittsburgh.

The well known explorer, friend and one-time co-worker with William Beebe, internationally famous scientist, has recently returned to this country after a five months' search, into the heart of the British Guiana jungles, for the "Lost World," a legendary plateau of gigantic proportions which natives have heralded as the regular haunt of animals whose appearance and habits are said to be surprisingly like the great prehistoric beasts that roamed the ancient world.

It was only a few years ago that Sir Arthur Conan Doyle's book of the same name and subject was hailed as a highly imaginative piece of work, but far afield from legitimate science. But despite this fact, Dr. Williams, himself a conservative scientist, decided that there must be some measure of truth in the native legends he had heard so frequently during previous trips in the general region. So with only a couple of incomplete maps and a compass to guide him, besides a native black, unfamiliar with the interior, to carry his provisions, the explorer set out from Georgetown on the coast of British Guiana, on a perilous journey the like of which probably has never been attempted before—so far, at least, as that thickly forested territory is concerned.

Strictly speaking, Dr. Williams failed in his quest, for he did not actually set foot in the "Lost World". But he is convinced that he came within only about 15 miles of



Above, the intrepid explorer has a strangle-hold on a fer-de-lance, a particularly vicious variety of snake. At the left is an "at home" picture of Dr. S. H. Williams.

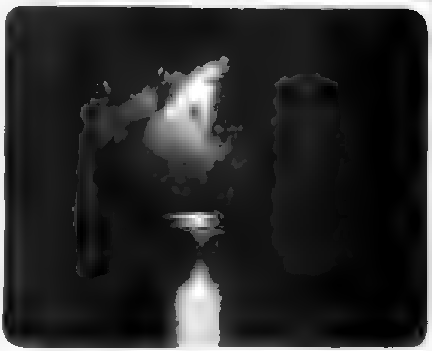
Seek the LOST WORLD

Fantastic creatures such as these, which trod the earth millions of years ago, are credited by local legend with inhabiting the "Lost World" plateau of British Guiana, made famous by Sir Arthur Conan Doyle in his book of the same name. At the left is a photo of the plateau taken by Dr. Williams just before he was forced to turn back within sight of his goal.

its exterior—near enough to catch a glimpse of it from the top of a high hill—and in all events considerably nearer than any other white man had ever been. Whereupon, stricken with malaria, almost entirely out of food, and covered from head to foot with thousands of itch-provoking insects, he was forced to turn back.

Propped up on a couch in his Pittsburgh home, suffering from a recurrent attack of that self-same malaria, Dr. Williams tells the story of his unique search:

"In preparing for my trip, which was primarily concerned with finding, if possible, some new forms of insect and animal life, I quite naturally chose Georgetown, a well settled coastal town, as my starting point. A faithful black, who had accompanied me as provision carrier in the past, made his home there, and I chose to remain a week, gathering together what few maps were available, as well as making mental notes of the legendary gossip about the 'Lost World.'



The falls of Kaieteur, shown above, are five times as high as Niagara, but only a handful of white men has ever seen the spectacle. The shimmering beauty of moonlight in the jungle is depicted in the photo at the left. The photos with this article were taken by Dr. Williams.

"My plan was to go first of all to Kartabo in the Bartica district of British Guiana. Three mighty rivers flow through the district. Of these the Essequibo is the largest, with a width of nearly four miles at Bartica. The river's largest tributary is the Mazaruni, which runs over a circuitous path from the west to join the Esecquibo near Bartica. Six miles above this point the Mazaruni receives the waters from the treacherous and mysterious Cuyuni River which has its origin somewhere in the Venezuelan forests and flows from the northwest.

"At the junction of the Mazaruni and Cuyuni rivers, situated on the southern shore of the latter and surrounded on three sides by the jungle, stands the tropical research station established in 1916 by William Beebe under the auspices of the New York Zoological Society.

"To reach this station at Kartabo I had to spend about a day and a half in a government steamboat, a most delightful ride through the thickening primeval forests. Once arrived here I naturally stayed a few hours so as to renew acquaintances and brush up on preparations for the forthcoming plunge into the more remote parts of the jungle.

"As for the rest of the five months' trip —of course I can merely hit the high spots at this time since there are so many names of river points that are extremely hard to pronounce, let alone spell. However, I did have a quaint ride on an excellently conducted little railroad owned by the Aluminum Company of America, and throughout the semi-civilized river ports for some few miles I had the good luck to travel on boats owned by the same organization.

"In passing, I'd like to mention a striking occurrence that took place while I was riding in a borrowed launch near a place called Potaro Landing, which has been de-

scribed as on a sort of Nile River in the midst of very dense forest. Well, the little boat was chug-chugging merrily along when all of a sudden a chicken which we were keeping on board for future reference seemed to experience an unguarded moment. For with a tremendous swishing of feathers it flew overboard. Quick as a flash up popped a hungry head from the waters below us and I could distinctly see the peculiar nose of what the natives call a 'caimen,' a nose not quite so pointed as that of a true crocodile nor yet as blunt as an alligator's.

"All this time, of course—and I was now on my third day out of Georgetown—my travelling maneuvers, aside from the few mile trip by railroad, were by no means confined to waterways. Every now and again I would have to take good-sized portages through the dense brush. Although up till now I had experienced no great difficulty in finding my way about due to the fact that the white folks, mostly Englishmen engaged in commercial enterprises concerning the finding of gold and diamonds, were on hand here and there.

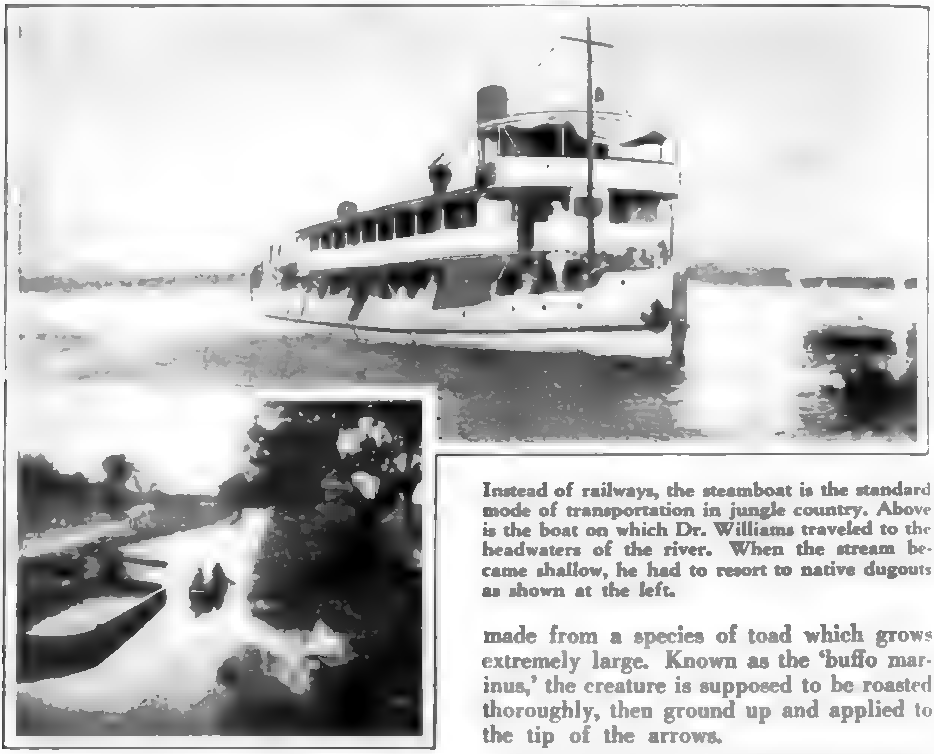
"However, one more sizable portage—this time to a place called Kangaruma, and I soon sensed the fact that I must be just about on the last outpost of a feeble civilization. Nary a white person was now to be seen, merely a typical African village, sparsely settled and with thatched structures of a crude sort.

"Here, too, were exceedingly primitive natives. Not black folks with fuzzy hair, as

A native woman holding a specimen of cassava root, which forms the staple food product of the jungle. The plant is a tuber somewhat comparable to the potato.

A native sugar cane press is shown above in action. It consists simply of a post with a sliding section which crushes the cane.

At left is a typical village of yellow Indians. Note that it is built close to the river, the highway through the jungle.



Instead of railways, the steamboat is the standard mode of transportation in jungle country. Above is the boat on which Dr. Williams traveled to the headwaters of the river. When the stream became shallow, he had to resort to native dugouts as shown at the left.

many people seem to think ought to occupy such a jungle region. But honest-to-goodness Indians, though yellow skinned rather than red, carrying bows and arrows and travelling about, where natural waterways permitted, in crude canoes built ordinarily out of solid logs.

"These yellow fellows had numerous curious habits, perhaps the strangest of all relating to tattooing. Not only would both men and women mark up their bodies, by means of extremely sharp stones, into beautifully worked out patterns, but they would carve parts of their faces as well.

"Another weird habit of the Indians was their wide use of blow guns through which they shot arrows dipped in an intensely violent poison which they call 'curare.' Oftentimes I have seen the plant from which they claim to derive this death-dealing potion—a tall growth about the size of a lilac bush—but to this day I must confess myself at a loss as to just how the poison is prepared. Still another effective poison is made from a species of toad which grows extremely large. Known as the 'buffo marinus,' the creature is supposed to be roasted thoroughly, then ground up and applied to the tip of the arrows.

"Since I do not know the language of the yellow Indians, nor did my faithful black, since he was from the coastal district—you may well ask, how did I make myself known without unduly antagonizing them? My answer is that there is a universal language of trinkets that practically every primitive race, if approached with reasonable gentleness, is able to understand. With me I had taken care to bring sundry bright-colored beads and bits of calico, and by their careful use was able to persuade a good many of the Indians to transport myself and my black via the canoe method to otherwise inaccessible places.

"But even with these jungle experts at my command, no one need suppose that I was therefore able to keep from getting lost. The fact is, that though I told the Indians, after consultation of my compass, what I believed was the general direction of the 'Lost World,' I had no measure of assurance that I was headed right because my maps on the region proved to be hopelessly

(Continued on page 166)

Towering Mast of Racing Sloop Being Carried to Dock

THE huge mast of the racing sloop, *Vanitie*, which has several times represented the United States in competition with Great Britain for the Sir Thomas Lipton cup, is shown above being carried to the boat to be put in place. The mast is 157 feet in length and requires approximately 40 men to raise it on the ship. It is 26 inches in diameter at its bole and 16 inches at the top. Weighing two and one-half tons, it was wheeled on carriages to the dock.

The *Vanitie* carries a crew of 30 men, to operate the immense sails. When it is not used for racing, it is employed as a schooner, another mast being erected. The ship was designed by William Gardner and is approximately 95 feet in length. It cost about a quarter of a million dollars to build.

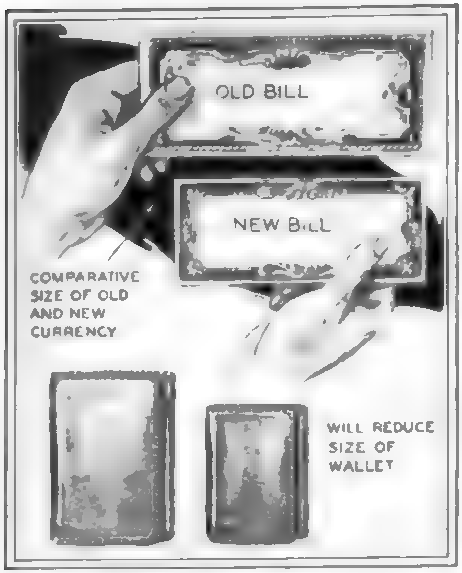
Daily Air Service to Alaska

DAILY mail and passenger air service between Seattle, Washington and Juneau, Alaska was recently inaugurated. Each of the ships of the new line is equipped with pontoons and does all landing and taking off in the water. The planes are of Lockheed-Vega design and are powered by single Wasp 425 h.p. motors. In addition to mail, express is also handled.

The service supplies a need that has long been felt between Alaska and the Pacific coast. As practically all of the flying is done over water, the pontoons allow a ship to come down safely anywhere on the route. Passing ships are sure to pick up a plane, if it is disabled.

Anyone finding it necessary to make a hurried trip to Alaska may now do so in a single day.

New Billfolds Necessary as Result of Change in Currency



WITH the recent change in size of the currency of the United States comes the consequent revisal in the design and size of wallets and billfolds. The new bills have been reduced in length from 7⅜ inches to 6⅜ inches. The width has been shortened from 3⅛ inches to 2¾ inches.

The innovation of this new policy of the U. S. Treasury took place on July 1. At that time all new currency issued by banks was given out in the smaller form. The old bills will be used until they are withdrawn from circulation.

Considerable saving in the amount of paper used in the manufacture of treasury notes will be effected by this change, and currency will also be much easier to handle. Smaller wallets also mean that a man's hip pockets will not bulge out as if they were stuffed with a half dozen handkerchiefs.

Plane Falls Into Governor's Room

A GAPING hole recently yawned in the ceiling of the sleeping room of Governor Morgan E. Larson of New Jersey when three callers in an airplane literally dropped in. A biplane carrying two passengers landed on the parade ground of the "little white house" at the governor's summer home. Striking a flag pole when leaving, it tore off a wing and dove through the roof.

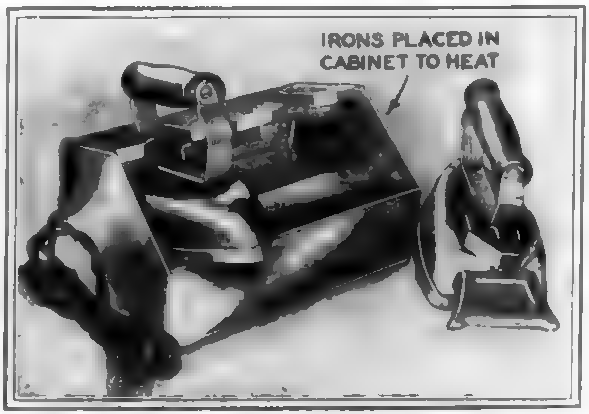
"Poison Cupboard" Was For Sale

CONTAINING nearly 100 secret drawers operated by a complicated mechanism, "Lucrezia Borgia's poison cupboard," was recently for sale in Berlin. A beautiful piece of Italian workmanship, the relic was the property of many of the czars of Russia before the revolution. Each of the drawers contained a deadly poison designed to serve the murderous lusts of beautiful Lucrezia.

Pressure of a hidden spring would open any of the drawers that she desired.

Cordless Electric Irons Make Pressing Clean Clothes an Easy Task

TROUBLESOME cords of these electric irons shown at right are eliminated by the cabinet in which one iron is sitting. They heat by contact effected in the cabinet, which is attached to a regular electric light socket by a plug and short cord. Two irons are used in order that one may be heating while the other is pressing clean clothes. The cabinet is insulated very thoroughly, and does not heat itself. Therefore danger of the board catching on fire is done away with. Elimination of the usual cords aids the speed of the ironer.



Connection is made when the irons are placed in the cabinet.

A Baby Carriage Garage for Apartment House Residents

THE NEWEST and strangest of all garages—one housing baby carriages—has been built by an apartment house owner in Wollaston, Mass. to accommodate his tenants who had difficulty in maneuvering baby vehicles about the narrow halls and steps of the building.

The garage is built at the rear of the apartments under the steps leading to the back entrance. Each apartment has a stall-like section in the garage with a private entrance. When a mother comes home after taking baby out, she puts the carriage away.

Where Twelve Balloons Recently Took Off in Start of National Race

THE TWELVE entries in the recent national balloon race are shown below as they were being filled with gas in preparation for the start from Pitt Stadium, Pittsburgh, Pa.

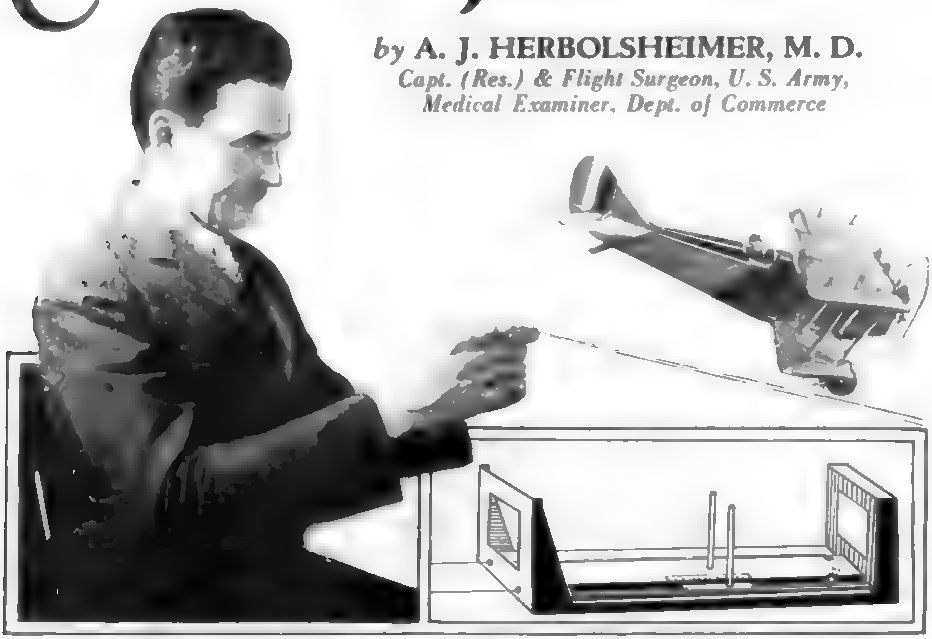
Navy Balloon No. 1 was declared official winner after it had remained in the air 44 hours and covered a distance of some 900 miles from Pittsburgh. It was manned by Lieutenant Thomas W. G. Settle and Ensign Wilfred Bushnell. With it, the second and third place winners will represent the United States in the International Gordon Bennett Balloon Trophy race that will start from St. Louis, Sept. 28.

Ascending from the stadium at five minute intervals, the balloons took off with ease.

Navy Balloon No. 1 traveled 900 miles in 44 hours from Pittsburgh to Prince Edward Island.

CAN I FLY?

by **A. J. HERBOLSHEIMER, M. D.**
Capt. (Res.) & Flight Surgeon, U. S. Army,
Medical Examiner, Dept. of Commerce



When you bank your ship, head into the wind, and cut the gun for a landing, will you make the field or overshoot it? This Depth Perception apparatus will tell you if you can judge distances.

"CAN I FLY?"

This is a question that is bothering a lot of young men — and some young women as well—every time they read accounts of the doings of Lindbergh, of Al. Williams, of Jimmie Doolittle, of a dozen other capable but less famous personalities of the air.

The answer is "yes" if you have one eye with half normal vision, two legs that will bend a bit and one functioning hand. But, ought you to fly? That is something else again.

Disqualification in certain government tests about to be described does not mean that a given individual cannot learn to fly but that flying in his case entails hazards to himself and others of such degree as to make it inadvisable for him to learn.

Naturally a fair weather flyer is not required to meet the demands made upon the man who takes his flying seriously. This the Department of Commerce recognizes and it licenses Private Pilots for whom the physical standards are quite low, but who are debarred from flying "for hire or reward." Such a pilot will do relatively little flying, and that under naturally favorable circumstances.

The kind of flying most would-be aviators aspire to is that represented by the Transport pilot. He is the man upon whom the Government places no restrictions as to time, place or cargo and who must be prepared to meet all possible demands that can be made upon a civilian flyer. The requirements for the Transport Pilot, then, will be those which we shall principally consider.

Good eyes are essential. That is an accepted fact even by the uninitiated, but to most this refers only to acuity of vision. In the flyer it means more; it means good judgment of distance, ocular muscle balance, accurate color vision, freedom from eye dis-

Yes! says Air Medical Examiner

Delicate machines help examining surgeons to decide on one's physical fitness for piloting an airplane, as described here by an army surgeon who examined hundreds of prospective pilots during the World War.

Depth Perception Machine. Two rods are brought into juxtaposition by the man on the left operating them through strings at fifty feet. He must bring them to within three centimeters of each other to pass.

ease externally and within the eyeball itself, and ability to see laterally at a wide angle while looking ahead. As to visual acuity the pilot should have full normal (20/20) vision in each eye. Corrected goggles are not looked upon with favor since they may become fogged or smeared with oil, leaving the pilot helpless.

It is not enough that the pilot have normal vision in one eye if the other is much below standard; much better if both are slightly and equally sub-normal. It is constantly demonstrated that the unbalanced condition resulting from unequal vision in the two eyes produces poor judgment of distance. Pilots are being continually required to judge distance in landing and in taking off from the ground, distance from other planes, obstacles, etc. On the ground where there are plenty of intervening objects to gauge by, this is relatively simple but in the air it is another matter. Here it depends upon several physiological factors plus considerable experience. In the examination of the candidate for license a device is employed (the depth perception apparatus) which calls into use the same physiological functions that the aviator must rely upon in judging distance when off the ground.

By ocular muscle balance we refer to the coordination of the twelve small muscles (six for each eye) which maintain the direction in which the two eyes look. These muscles work in pairs and should be properly balanced, but often they are not. When this occurs, one of two things happens: either the man sees double and learns to disregard the image of one eye, where-

Pilot's Licenses

are granted by the Aeronautics Branch, U. S. Department of Commerce, to men and women who successfully pass the requirements set forth in Dr. Herbolsheimer's article. There are four types of licenses: student, allowing of instruction work, private license, granted for 10 hours' solo work, limited commercial, granted for fifty hours of solo work, and transport license, given for 200 hours' solo work and for qualifying in navigation, meteorology, etc. Transport pilots may fly anything anywhere.

Do You See Double? This'll Tell You!

Do you have heterophoria, or defects in the muscular balance of your eyes? Serious trouble may disqualify. This device brings ocular defects to light.

upon he is in the same position as a one-eyed person, or he overcomes the incoordination by muscular effort. This he can continue to do until he becomes fatigued. When this takes place the vision of the two eyes becomes dissociated, visual acuity and depth perception fall off, he develops a headache and is no longer efficient.

The importance of muscle balance was well illustrated in the war. Many students making poor landings were found to have poor muscle balance. Through proper muscle exercises 85% of these were able to qualify and had no further trouble with landings.

Eyes Can be Corrected

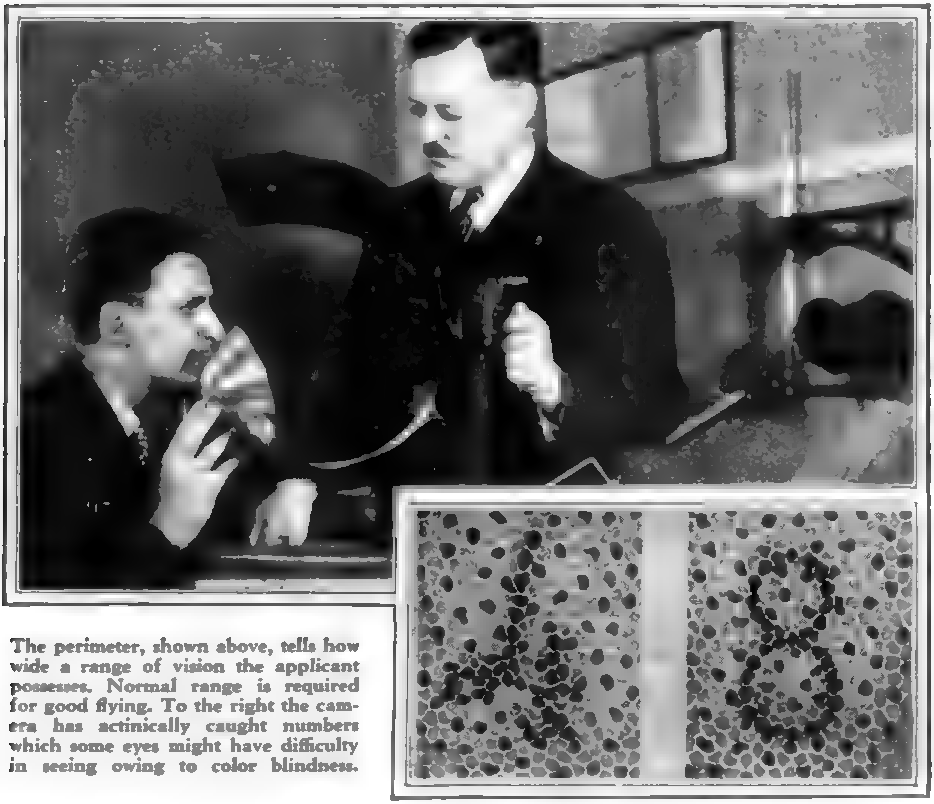
Ocular defects on the whole are not so hopeless as at first might appear. A number of men in my experience who previously had been under the impression that they could not qualify for *any* grade of license, with a little persistence on their own part and with a little careful supervision have been able to qualify for the private grade of license. Naturally good judgment dictates that such a person must be long enough in the air to be thoroughly at home in a ship; that is, he must fly instinctively before thinking of anything but fair-weather flying. Even then some can be expected to come to grief under circumstances where a better man, physically, would probably pull through. For this reason the Medical Section of the Aeronautics Branch does not look with too much favor upon a man who meets the requirements with difficulty.

Continuing with the examination we find next on the blank the inspection of the eye externally. Any diseased condition which would interfere with clear vision through inflammation or tearing must, of course, disqualify until cleared up. Accommodation, or the ability to focus the gaze on near objects must be sufficient to enable the pilot to read his maps and instruments readily. However, at the ages during which men are most active as aviators accommodation is likewise still active unless disease is present, and when they reach the age where this faculty fails, the fruits of their labors it is to be hoped will have been such as to make it unnecessary for them to continue active flying.

Importance of Color Vision

The importance of color vision goes a little beyond reading red and green signal lights. Sharp color discrimination plays a large part in the proper recognition of the terrain over which one is passing and is therefore essential in the selection of an emergency landing field. When gliding to make a landing, to be able to discriminate at a height between the color of a plowed field and that of a meadow stubble or dry pasture is certainly an advantage.

In the older tests using colored strings of yarn the chief objection lay in the relative color *ignorance* rather than color *blindness* of the average individual. The more recent tests, consisting of spotted colored plates with numbers in another tint concealed in the background, require no knowledge of color. If the eye is sensitive to the colors employed and can distinguish one from another the numbers will stand out. If the numbers are invisible, then the eye cannot discriminate between those colors and the man is color blind.



The perimeter, shown above, tells how wide a range of vision the applicant possesses. Normal range is required for good flying. To the right the camera has actinically caught numbers which some eyes might have difficulty in seeing owing to color blindness.

Color blindness may be complete or partial and is much more common than one would ordinarily suspect.

In certain cases color blindness is toxic and is amenable to treatment. The writer has been able to qualify at least one applicant who when first examined demonstrated a definite partial color blindness.

Range of Vision

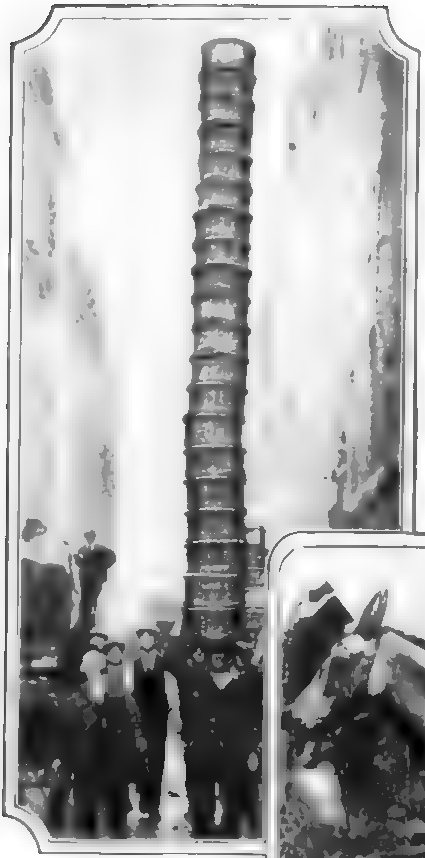
In manipulating a conveyance traveling with the speed of the modern airplane the pilot has need of a wide range of vision laterally. He must have normal visual fields. This is tested by the *perimeter*; an instrument consisting of a revolving arc on which colors are carried into the subject's field of vision. An automatic device records the limits for motion and colors on a card. This instrument also directs attention to certain ocular diseases not readily suspected otherwise. An internal examination of the eye is also made with another instrument designed for that purpose. Not only eye diseases, but certain serious systemic diseases may be recognized through their efforts on the eye by its aid. From the foregoing it can be seen that the eyes hold considerable interest for the medical examiner and rightly so, for they are the pilot's principal source of information when off the ground.

The ears, nose and throat follow in order. Hearing is of relatively little importance and 40% of normal for the commercial, and 15% of normal for the private pilot is considered sufficient. The ear should be free from disease because of the liability of ear disease to produce dizziness and affect the balance. For the same reason the eustachian tubes which supply air to the middle ear must be freely open in order that there be no unequal pressure on the ear drums. Pilots should practice inflating the middle

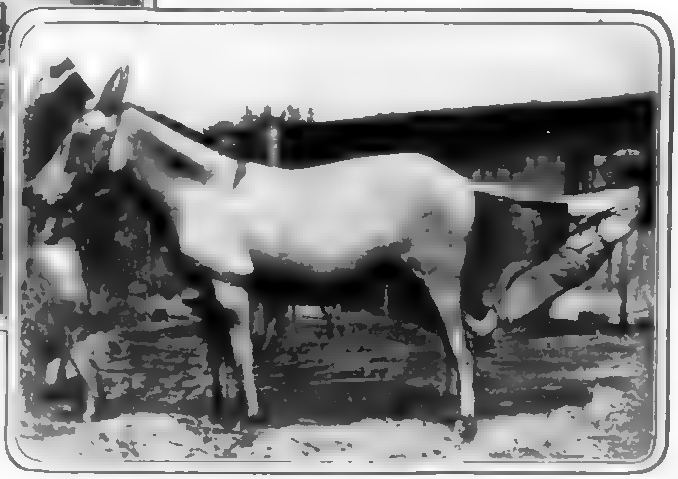
(Continued on page 177)

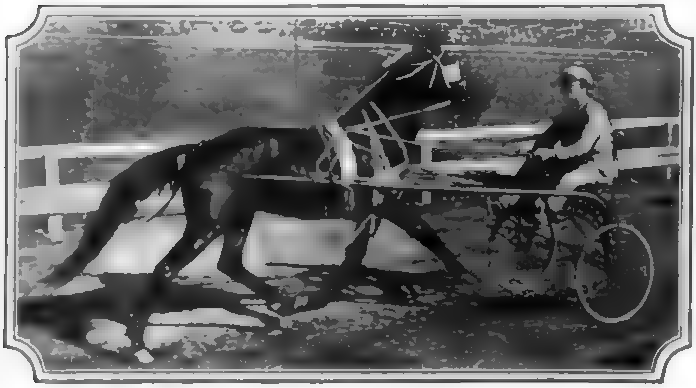
All in the

Ever get tired of the monotony of your job—weary of doing the same old tasks in the same old way? So do other folks, and as shown in the photos on this page, some of them adopt unusual methods of injecting a bit of fun into the job of living. Whether it's a basket-balancing contest or a peanut-pushing race, a bit of sport helps to take the edge off the daily grind.



"Twenty baskets on the bean" might be the title for the above picture, showing a London greengrocer walking down a street doing his balancing act.

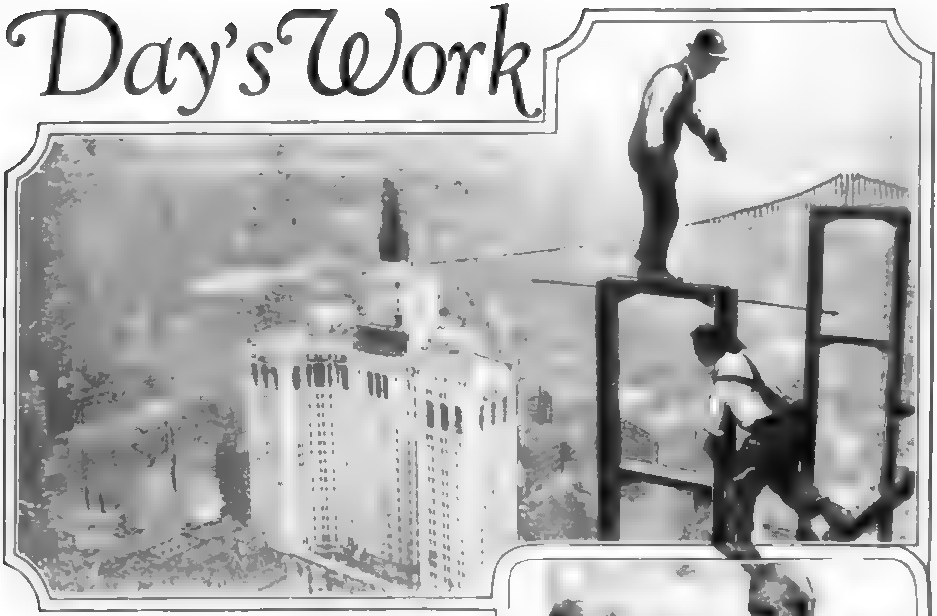




Above—Johnny plays with dynamite in balancing on a Missouri mule's hind knees. Anyway, it's an almost sure-fire method of getting a kick out of life.

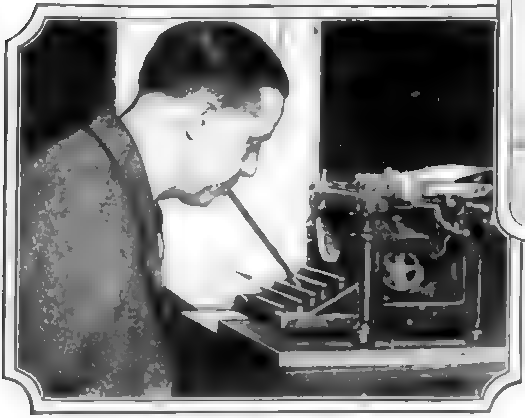
At left—In performing this stunt the horse proceeds around the track pushing the racing gig ahead of him. It adds zest to the daily task of exercising thoroughbreds.

Day's Work



For real thrills, it's hard to beat the structural steel worker's job. The above photo was taken during the construction of the Woolworth building, and shows a playful workman gamboling on a girder 700 feet above the city's streets. Question: how did he get up there? Another question: how's he going to get down with a whole neck? The large white building in the foreground is New York's City Hall, the dome of which is shown under construction. In the background can be seen the Brooklyn Bridge. The Woolworth building, long the tallest office structure in the world, will be outdone in size by the Chrysler Building now under construction in New York.

It's a whole day's work in itself taking care of a set of whiskers like those pictured above. The two gentlemen are forty-niners who recently met at Sacramento, Cal., to compare notes on their whiskers. After unwinding them, it was discovered that the set on the left measured 11 feet, 3 inches, while that on the right was 17 feet long. If placed end to end they would reach from here to the end of the block.



Tom McAuliffe of Los Angeles lost his arms in an accident when 9 years old, but he is an expert typist, using a pencil in his mouth to tap keys.

Time Is Saved by Using This Novel Newspaper Clipper

A SINGLE movement of the wrist with this simple device shown at left cuts both sides of a newspaper or magazine article. An adjusting screw permits the knives to fit a column of any width. The clippings' tops and bottoms are cut by using merely one blade. Cutting is done with the newspaper or periodical placed on a flat surface. A heavy piece of cardboard is set directly under the page that is being defaced. The clipper does not require any pressure.

Driver Seeks to Pass 300,000-Mile Mark in 21-Year-Old Automobile

HAVING toured all but three states of the union in his 1908 seven-passenger automobile, Sumner S. Johnson of Minneapolis, Minn., is setting out this summer to take in those states he missed. The old car has been kept in perfect condition and is now past its twenty-first birthday. To date, it has traveled a total of 277,950 miles and Mr. Johnson intends to run the mileage up to 300,000 before fall.

He is also planning to keep the car in his possession until its age has reached the quarter century mark. Then he will allow the manufacturers to give him a new one for the privilege of using his old car for exhibition purposes, as they have long wanted to do.

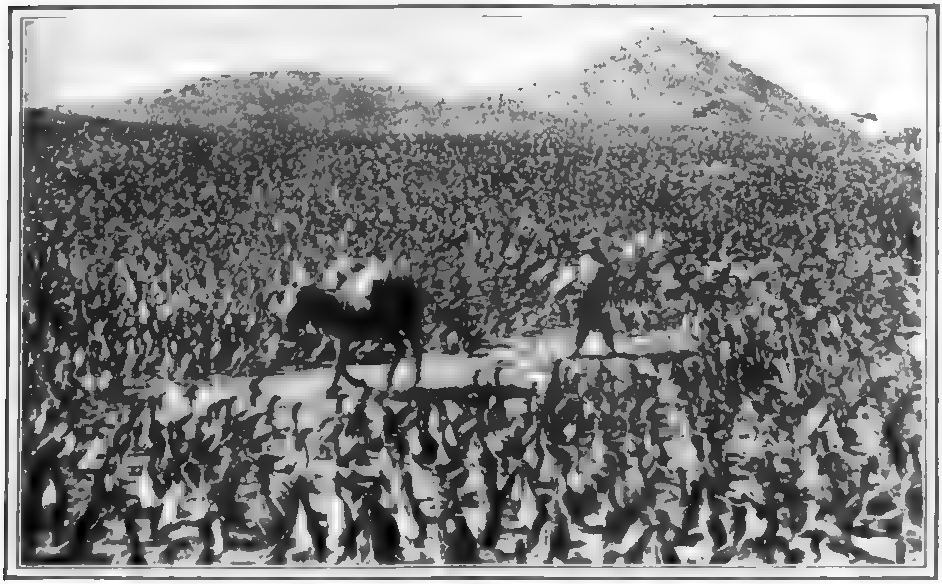
With the exception of the hood, the car is still wearing the same 19 coats of paint that were put on when it left the factory. The full leather top which covered it originally has been removed in favor of a modern type—otherwise the only replacement of parts has been a valve stem guy, which cost 90 cents. A starter has been added, and electric lights replace the old kerosene ones. But aside from brake linings and things that have to be tended to regularly on any car after it has traveled a certain distance, the owner claims that his repair bills during the period of his possession of the car have not surpassed $5. "Careful driving plus good care equals no repair bills," he says. The original brass mountings and fixtures are still brightly polished, and the leather is unworn.

Removing a Splinter

WHEN Caesar, baby African lion of a San Diego zoo, ran a splinter into his paw, the zoo doctor was called to extract the sharp piece of wood. Strapping the young lion to a bench in the "hospital," trainers quieted him while the doctor worked. Caesar was much easier to handle than his father or mother would have been. Special equipment is provided for the larger and more ferocious animals of the zoo to hold them when they are sick or have been injured.

"Hospital" of a San Diego zoo, where cub lion is being treated.

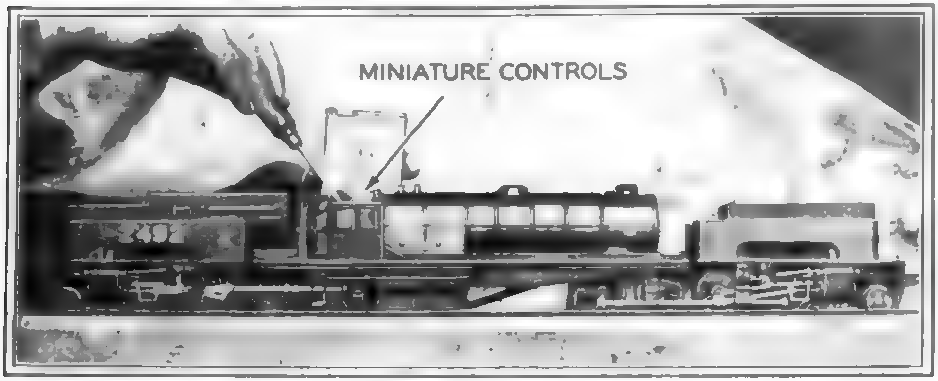
Penguins Move Enmasse on South Sea Isle to Guard Eggs



COVERING every available piece of land on a small island in the South seas, hundreds of thousands of penguins, strange aquatic birds shown above, tend their eggs during the period of incubation. The birds have a general elliptical shape with a neck of moderate length. Their heads are small with a comparatively long bill. They have no quills in their wings, which are useless for flight. However, their flippers move freely from the shoulder joint, making good paddles for swimming.

New Designs in Model Trains and Equipment at London Exhibition

ONE OF THE models that was recently entered in the Model Railway Exhibition at Kingsley Hall, London, is shown below. It is powered by a small steam engine that pulls a train load of cars about a miniature track at a fast rate of speed. By pressing a button on the side of the track, a projection rises and hits a small lever at the bottom of the engine, shutting off the steam.



Model is designed after a double-drive engine. The water reservoir is in front with tender at rear.

One Man Bicycle Dirigible

A dirigible balloon, run by foot power with bicycle drive, is being built by a Vermont inventor.

INTEREST in aviation is by no means exclusively confined to light airplanes, as is demonstrated by the number of letters contributed to MODERN MECHANICS' Shop Mail Box in which the writers inquire as to the possibility of constructing a small dirigible balloon which can be operated by man power. A dirigible powered with a bicycle, as depicted in the drawing above and as shown on the cover of the magazine this month, is under process of construction by Ray Fraser, of Brattleboro, Vermont.

As planned by Mr. Fraser, the bag of his balloon will be 30 feet long by 15 feet in diameter. The bicycle power plant is to be suspended beneath the bag, the pedals being connected by a chain drive to a propeller which, it is estimated, will drive the craft at a speed of about ten miles an hour. Steering rudders of the ship will be operated by bicycle handlebars, while the elevators will be manipulated by a small wheel at the rear of the pilot's seat.

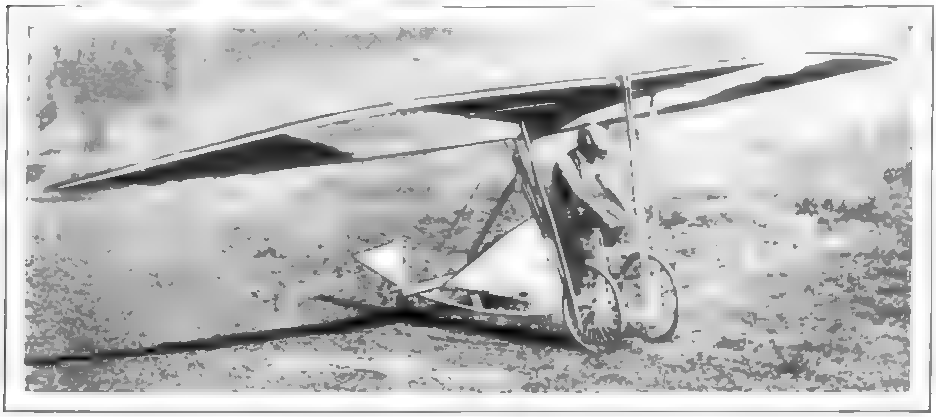
Although the idea of a tiny dirigible such as this is an appealing one, the item of cost will make such a ship impracticable for the amateur aeronaut. The bag must be filled with expensive gas and a suitable hangar must be erected to protect the ship from the weather. Furthermore, the cost of shaping the bag from rubberized fabric and attaching the working parts would run the initial cost of the dirigible to approximately $10,000. The ship could be flown only in calm weather, since the 10 mile an hour speed would leave it helpless in a modest breeze. The addition of a motor would, of course, increase the speed, but it would also require an increase in the gas bag volume of at least fifty per cent.

Small Dirigible Powered With Motorcycle Engine; Lifts 500 Pounds

Note the unusual two-lobe construction of this tiniest of powered dirigibles, recently tested at Wright Field, Dayton, Ohio. The tail lobe is jointed so that it can be moved about to control the ship.

Mr. Fraser's inspiration for his bicycle balloon perhaps was derived from a study of the world's smallest dirigible, shown in the photo above. It is a unique ship of two lobes, the rear of which acts like a jointed tail which can be moved to steer the ship. A four cylinder Henderson motorcycle engine is used for power, developing a speed of 20 miles an hour. Designed by Matthew Q. Corbett, the unusual craft weighs only 800 pounds complete and can carry a useful load of 500 pounds.

Another aircraft which combines features of balloon and airplane is pictured below, the invention of E. Winter, of Fareham, England. It is a glider-like machine fitted with flapping wings which are intended to give it forward motion. Lifting power is supplied by a tank of hydrogen. Thus far, it has not been tested successfully.



This queer machine is a flapping-wing glider, operated by foot power, which is expected to ascend by the buoyancy of its hydrogen filled tank, which is the triangular white object under pilot's seat.

Edited by MAJOR H. H. ARNOLD

Aircraft Are Vital Units in Battle Plans for the Next War

DURING the past few years there have been many improvements in the implements of war. Tanks can now attain a speed of over twenty miles an hour and types have been produced which can travel over land or float on water. Armored cars have been provided for cavalry, thus giving the advanced patrols of that mounted force a very fast and powerful weapon. Anti-aircraft guns are now aimed and fired in groups by electricity. Gas and smoke can be thrown out in clouds and curtains by aircraft. The radio controlled autos operating in different parts of the world were only forerunners of radio controlled airplanes such as have recently been demonstrated in France. Nations that numbered their airplanes in hundreds in 1918 now plan on having thousands available for any future emergency.

It is highly probable that any future conflict will see planes by the hundreds striking on the opening day. These planes will be able to do many things that could not be done in the past. The pursuit planes will travel through the air at a speed of about 200 miles an hour. The bombers will carry loads of 2000 pounds and will have machine gunners for protection in front and rear, making it quite a task for the pursuit planes to find a blind spot for their attack.

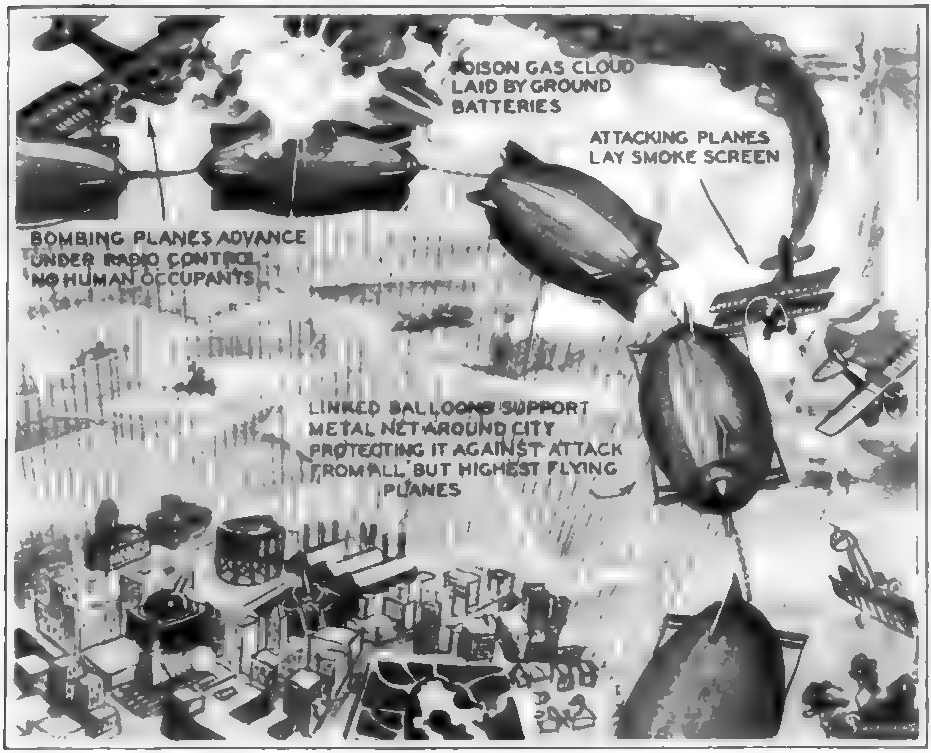
Cities and other important places will be protected by zone after zone of electrically controlled anti-aircraft guns that are directed on the aircraft without the aid of human hands. At some distant point there will be several men taking down and recording data on the approaching fleet of airplanes. As the data is entered on the machines, the guns will automatically move in elevation and traverse themselves to make hits instead of misses.

Major H. H. ARNOLD
One of the pioneer figures in the world of aviation, Major Arnold is admirably qualified to serve as editor of this monthly aviation department of Modern Mechanics. He was present at the first demonstrations of the Wright plane as an official government observer, and ever since that time he has been actively engaged in some branch of flying. During the war he was assistant chief of the Air Service.

Zones of searchlights will be placed beyond the guns so that the approaching aircraft will be illuminated before they reach the danger zone. When the searchlights open up, the attack planes, coming in over the tree tops like streaks of light, will open up with their bursts of tracers and drop their small bombs in an endeavor to extinguish the lights.

Balloons will be placed at

Balloons Supporting Metal Cables Protect City Against an Aerial Attack



An artist's conception of an aerial battle of the next war is presented above, showing the different methods of attack and defense. Metal cables suspended from balloons, gas clouds laid high in the air from ground batteries, and smoke screens laid by planes are all developments of military science.

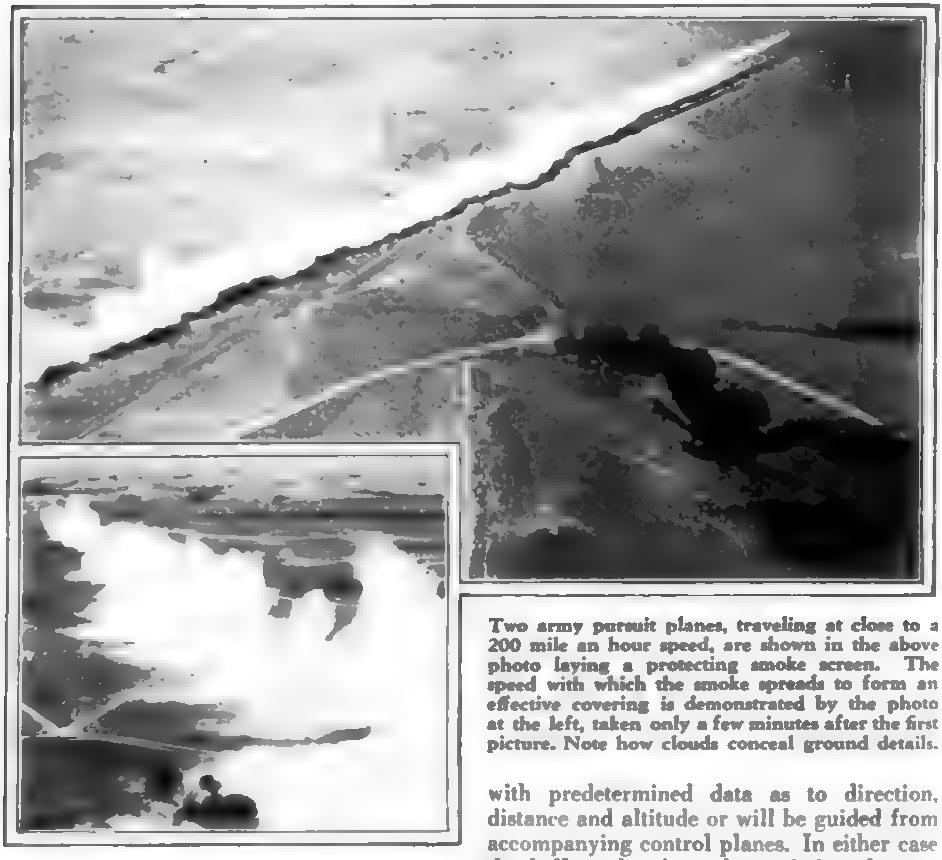
intervals around all important areas. Each balloon will be connected to the ground with a steel cable and from the adjacent ones with horizontal steel wires. Thus there will be formed an impenetrable, invisible barrier through which the attacking planes can not pass. It may be that the large caliber guns will be able to throw gas shells into the air, forming a gas cloud which will knock out the pilots when they enter the gas zone. It is possible that defense planes will be able to lay a smoke screen high in the air through which the airmen can not pass, or a cloud which will deprive the engines of oxygen and thus bring the planes down.

It might appear that the airplanes coming in to attack may get the worst of the exchange of death-producing missiles, but the engines having superchargers will be able to take the bombers high above the balloon barriers and to altitudes where the anti-aircraft guns are unable to shoot accurately. Then again they can take advantage of low fog, clouds and murky days, weather conditions which permit the man in the air to see when the man on the ground is blinded.

The bombers will carry loads of demolition, incendiary and gas bombs. Superchargers will be installed on the engines to enable the planes to get above the accurate range of anti-aircraft guns. At the extreme altitudes the bomb sights will be just as accurate if not more so than at the lower altitudes.

For protection, the bombers will be accompanied by fast pursuit planes laying smoke screens at a rate of over two hundred miles an hour, attack planes dropping small bombs and spraying machine gun bullets on the anti-aircraft guns. Thus about the time

Attackers Can Advance Under Cover of Smoke Screen Laid by Planes



Two army pursuit planes, traveling at close to a 200 mile an hour speed, are shown in the above photo laying a protecting smoke screen. The speed with which the smoke spreads to form an effective covering is demonstrated by the photo at the left, taken only a few minutes after the first picture. Note how clouds conceal ground details.

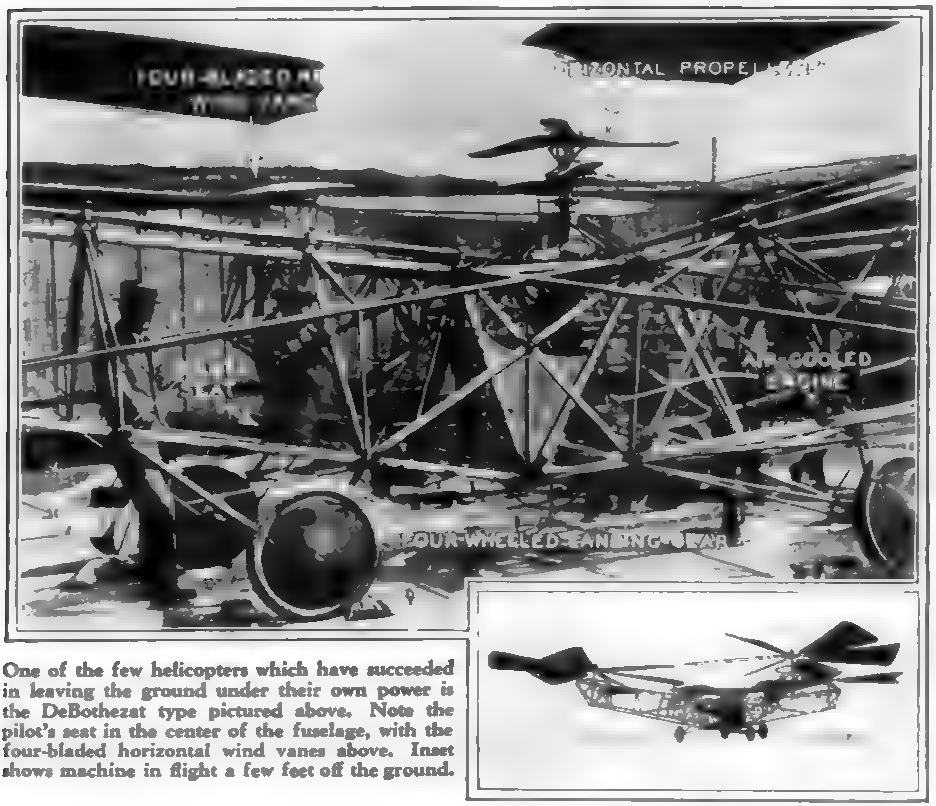
of arrival of the bombers, the anti-aircraft defenses will be literally covered with gas, smoke, small demolition bombs and a storm of machine gun bullets.

The development of the radio has made possible the driving of the automobile without human hands at the wheel. It is now possible to guide an automobile through all sorts of intricate maneuvers from a control station far distant, either in the air or on the ground. Using the same general principles, the French have produced a plane which takes off, maneuvers and lands with the pilot seat vacant.

Such radio controlled planes will undoubtedly make their appearance and give additional trouble to the defenders against air attack. Such planes will be loaded with large quantities of high explosive and be guided toward their target in accordance with predetermined data as to direction, distance and altitude or will be guided from accompanying control planes. In either case the balloon barriers, the anti-aircraft guns and the gas filled air will not stop the attack, for such automatic planes will be sent out one after another in an ever increasing stream, stopping only when the objective has been destroyed. If one, two or three hit the balloon net, are shot down or make a forced landing, it will make no difference for there will be hundreds to take their place with no loss of life to the attackers.

There were so many innovations during the World War, the conflict was so extensive and the incidents of the battle field were so horrible that it seemed that the ultimate limit in scientific warfare must surely have been reached. Any student of science, mechanics or inventions can not help but realize the fallacy of any such conclusion, for man has never yet produced a perfect piece of machinery.

Helicopter Designers Achieve Small Success With Type



One of the few helicopters which have succeeded in leaving the ground under their own power is the DeBothezat type pictured above. Note the pilot's seat in the center of the fuselage, with the four-bladed horizontal wind vanes above. Inset shows machine in flight a few feet off the ground.

IN GENERAL there are two lines of thought in construction of helicopters. One school endeavors to secure its lift from the revolution of one or more large surfaced vanes, and the other from large propellers. Both types have been more or less successful; that is, there have been machines of both types constructed which left the ground for a limited period.

A typical helicopter was the Berliner. This machine utilized an ordinary aircooled airplane engine. For its lift, it had a gigantic balsa wood propeller which rotated in a horizontal plane above the structure. To secure balance, two smaller propellers were installed some distance from the central fuselage opposite to the pilot. Thus extra lift was obtained for lateral control by increasing or decreasing the revolutions of one or the other of these small horizontal propellers.

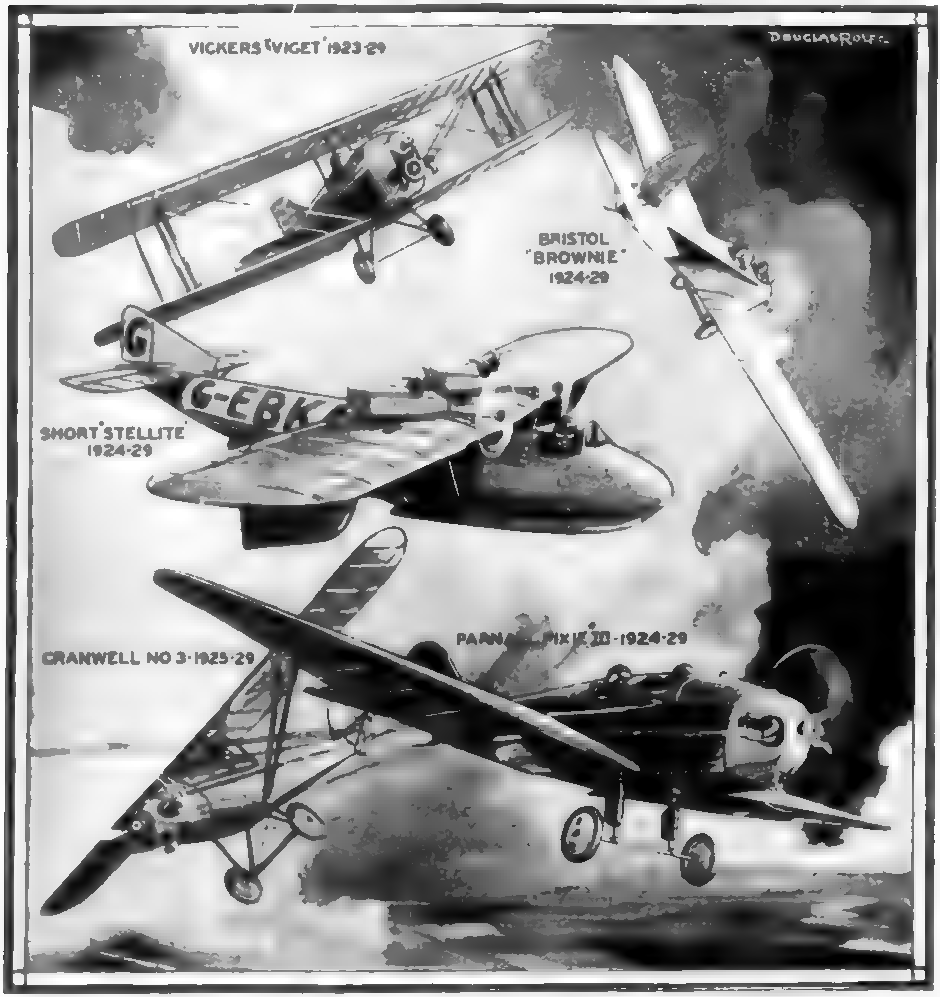
An additional small horizontal propeller was located at the stern of the device. By increasing the revolutions of this propeller, the tail was raised or lowered.

The De Bothezat helicopter had four revolving wind vanes, each with four blades to secure its lift. These were mounted at the tips of open structures similar to fuselages, crossing at a center point. The engine was mounted in a horizontal position at the juncture of the four structures.

The Berliner model had a landing gear very similar to the two wheel and tail skid airplane type. De Bothezat used four wheels mounted in pairs on axles.

These two helicopters have been by far the most successful produced in the United States. Both have made several successful test flights, but like similar aircraft produced in other countries, were not developed to a point where they could be called practical for use either commercially or for military purposes.

English Light Planes



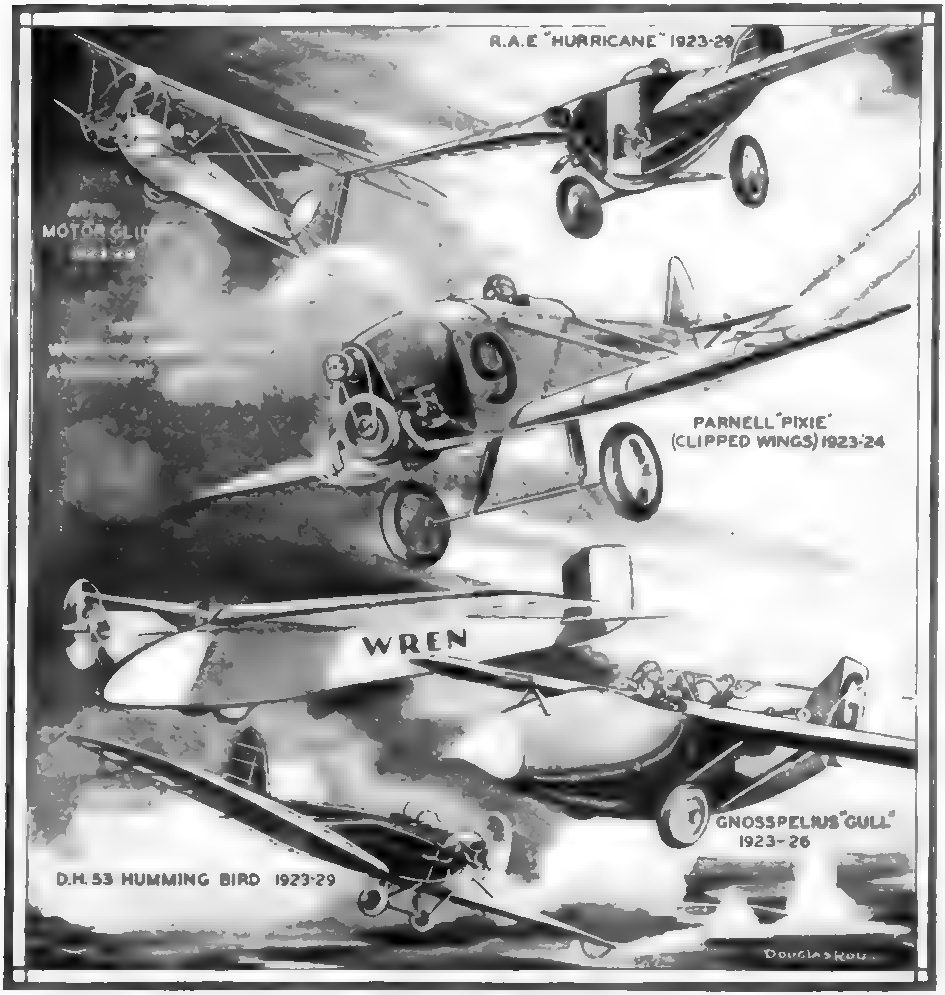
Because they are beautifully engineered down to the last fraction within the required factors of safety, these British Lightplanes which have been built from 1923 to the present year are enabled to fly with low horsepower.

By DOUGLAS ROLFE

FOR the past half dozen years our English cousins across the big pond have not been asleep when it comes to the development of light air planes. In fact they are to be credited with the inception of the movement, and the planes which they have built in this time, the more successful of which I have pictured above in light wash drawings, have led directly to the design of the high performing and so called lightplanes of today, the De Havilland "Moth", the Avro "Avian", and the Westland "Widgeon".

To the uninitiated let us explain that the

Perform Like Big Ships



From the tiny Wren, flown with but 2¼ h. p. and which can make 90 miles to the gallon of gas, to the stunting D. H. 53 powered with one of the 16 h. p. Bristol Cherubs, these planes have performance equal in every respect to the present 80 h. p. lightplanes.

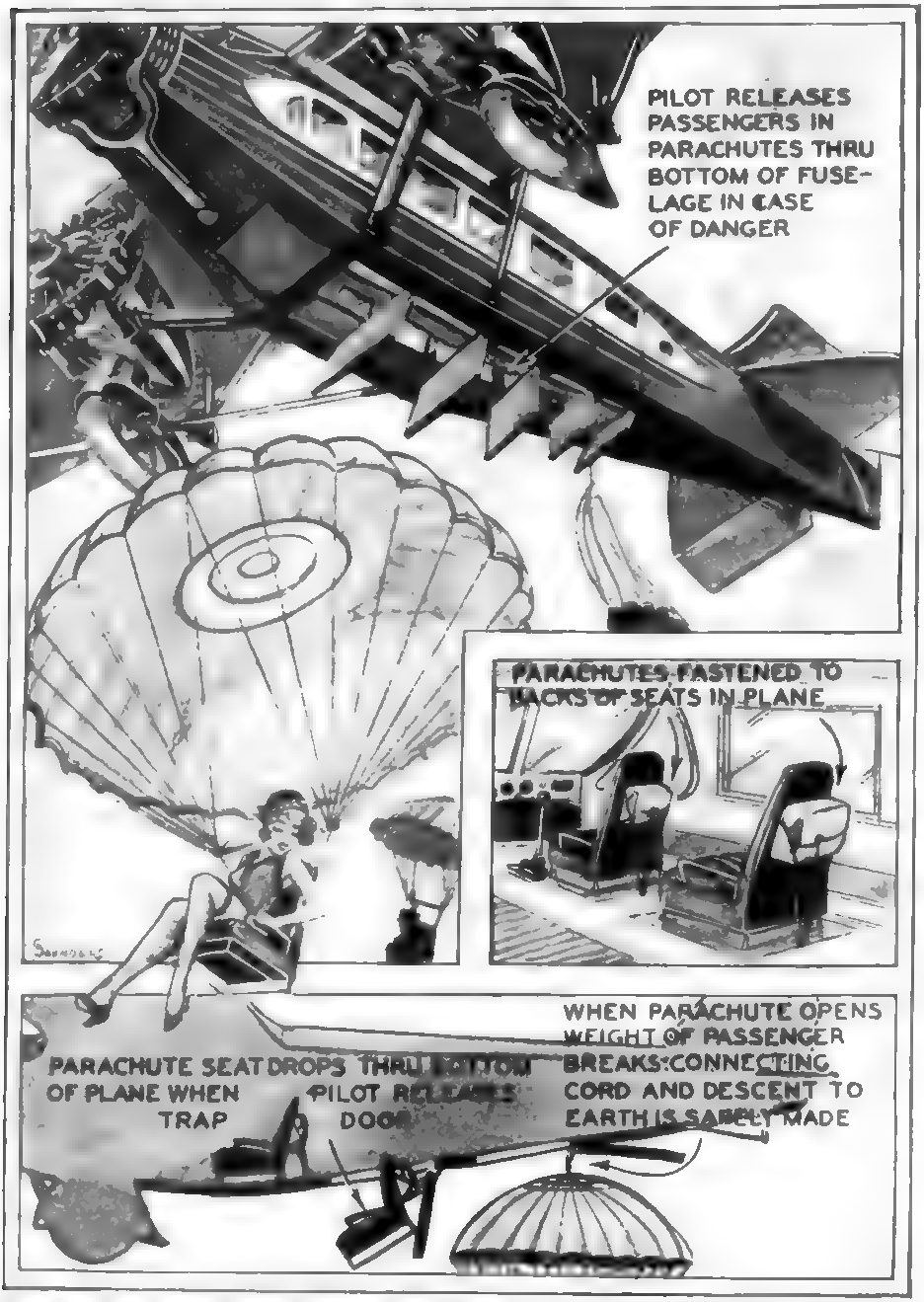
word lightplane is generally taken to mean a plane which will carry one or possibly two passengers on a power which is low enough to load the wings to the highest possible point, allowing of safe flight. Arbitrarily, these light ships are as good if not better in flight than their more highly powered 80-100 h.p. sisters. Most of their weights work out to 500 lbs. or less, loaded.

Let us trace the history of the lightplane movement. Thus we will be enabled to understand the progress that has been made and what lies behind the designs of today.

In 1923 a number of English aircraft manufacturers produced various types of

(Continued on page 172)

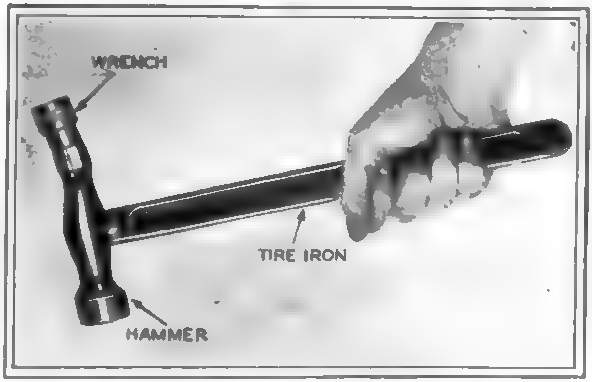
Parachute Seats Land Passengers of Airplane in Safety



One of the latest safety devices developed for airplane use is the seat parachute illustrated above which releases passengers through the bottom of the plane in case of danger. Builders are now experimenting with the device with the idea of developing it as standard transport plane equipment.

Hammer, Wrench and Tire-Changing Tool All in One

CHANGING a tire after a blowout or puncture may be accomplished with this single piece of apparatus shown at right—a combination hammer, wrench and tire iron. All of the equipment necessary to make a tire change is therefore available in this one tool, which may be conveniently placed in the side pocket of a car. The socket wrench is extremely easy to apply and provides a great amount of leverage. Graduations on the handle make the iron also a gas or oil gauge.

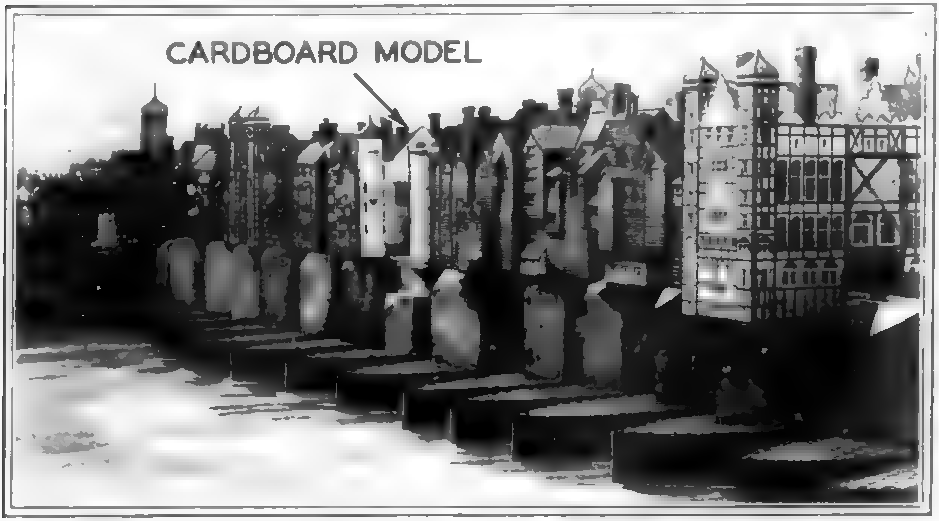


Model of Famous London Bridge

REPRODUCING the historic London bridge in miniature consumed more than 6,000 working hours of J. B. Thorp's time, but when the model, shown below, was completed it was a perfect replica of the bridge which has long been a central landmark in English history. The model is nearly 20 feet long and is complete in every detail. The shoppers of the period are shown in the arcades, sedan chairs are being carried through the streets, there is a man with a performing bear, and even laundry work is hung from the windows. A feature of the old bridge was "traitors' gate."

Submarine and Crew Are Rescued

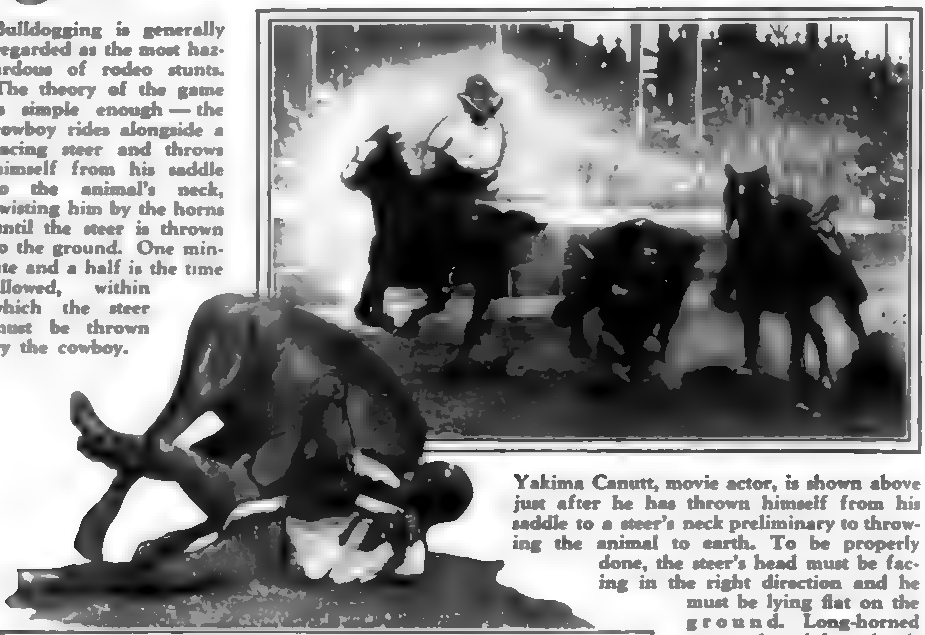
A UNITED STATES submarine and its crew have been rescued from the bottom of the sea for the first time in the history of Panama bay. The S-11, which went down to a depth of 87 feet, was found by the rescue submarines, S-12 and S-20, and was raised by the steamer Mallard a few hours later. Naval officers in charge were so impressed with the demonstration that they claim that no such disaster as the sinking of the S-51 with the entire crew aboard will be possible in the future. The signal of the disabled submarine was caught and she was soon discovered.



Original bridge was constructed with wooden pegs instead of nails and was brought from Holland.

BULLDOGGING

Bulldogging is generally regarded as the most hazardous of rodeo stunts. The theory of the game is simple enough — the cowboy rides alongside a racing steer and throws himself from his saddle to the animal's neck, twisting him by the horns until the steer is thrown to the ground. One minute and a half is the time allowed, within which the steer must be thrown by the cowboy.



Yakima Canutt, movie actor, is shown above just after he has thrown himself from his saddle to a steer's neck preliminary to throwing the animal to earth. To be properly done, the steer's head must be facing in the right direction and he must be lying flat on the ground. Long-horned steers selected from herds in Mexico are sent to Cheyenne especially for the bulldogging contests. A football helmet, as worn by the performer at the left above, is a comforting piece of equipment for the bulldogger to wear. Occasionally the steer succeeds in shaking off the bulldogger, and when enraged will often attempt to gore his enemy. To guard against such mishaps a second man rides alongside the steer, ready to rope him in case of danger.

The bulldogger above is caught just in the act of leaping from his saddle. In a moment, if he is successful, he will have his arms around the steer's neck and the animal will be in a fair way to "bite the dust."

At right a bulldogger comes off second best in a contest with a lanky range animal. The steer has shaken off the cowboy's hold and thrown him.

is Spice of the RODEO

A thunder of hoofs from the corral—a flash as a cowboy launches himself from his horse to the neck of a running steer—a swirl of dust which clears away to disclose the steer thrown flat to the ground—that's bulldogging, sport supreme of the picturesque rodeo!

OUT OF the corral comes tearing a wild and angry steer. Two intelligent fleet-footed cow ponies with daring riders start in hot pursuit. They easily overtake the steer, one riding on either side. Suddenly, at full gallop, a cowboy reaches out, seizes the steer's horns, slips from his saddle, and brings the animal to a halt. Then follows an interesting contest between man and beast, usually resulting in the steer toppling over on its side. The red flag of the judge is lowered, and the time-keeper announces that a new world's record has been made. There, before you, stands the newly crowned champion "bulldogger" of the world.

This is but one of a whole catalog of features, thrilling, enthralling and truly illustrative of the typically western exhibitions to be staged this season in a half dozen western communities. More than thirty years ago the first "Frontier Days" festival was presented at Cheyenne. The idea started in a small way, and is today one of the great events of the west, attracting thousands of spectators to the week-long program.

Cheyenne started the ball rolling. Cheyenne has no copyright on the idea, and here's good luck to any town with get-up and go enough to stage such a festival. Pendleton, Calgary, Phoenix and a score of other western cities stage rodeos every year.

Of all the wide variety of sports which are demonstrated at these rodeos, "bulldogging" is by long odds the most hazardous. It is more purely a sport than any other rodeo contest; wild horses have to be ridden, steers and cows have to be roped, but a cowboy could handle cattle all his life without encountering an occasion when bulldogging became a necessary part of his business.

There is the spice of danger in every phase of bulldogging, and its spectacular nature makes it the spotlight attraction of the rodeo. The cowboy races his horse close to a running steer, leans over, puts one arm around the steer's neck, and grabs the near horn, at the same time quitting his horse. He then swings his feet forward, bracing himself and digging his heels into the ground so that the steer is brought to a halt. Then he pulls down the near horn, puts his leg over it and reaches for the steer's nose with his free hand. He pulls the nose up until the animal falls. All this time, of course, the steer is trying to escape, whirling about, shaking his head and throwing his weight against the cowboy. Often the animal jerks away, knocks over the

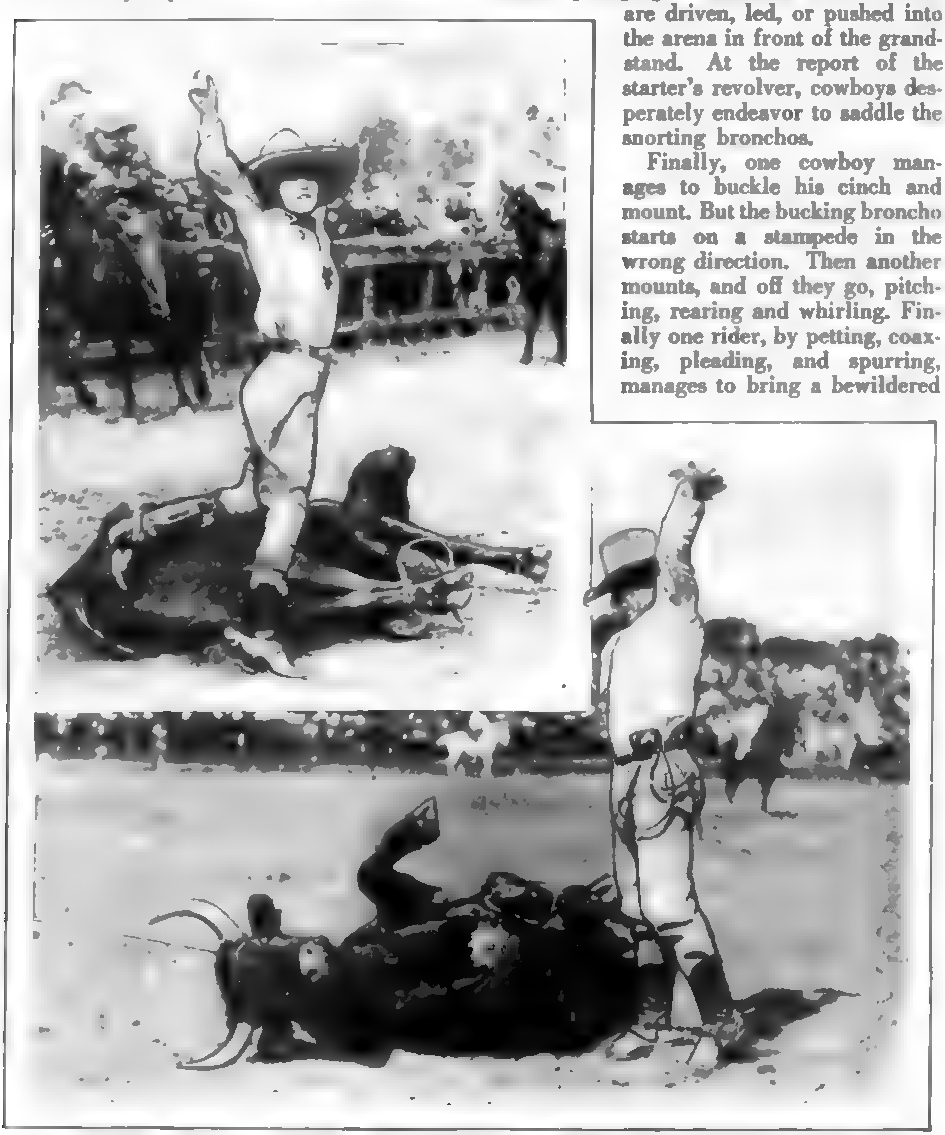
Bulldogging is purely a sport among cowboys, but riding fractious horses is all part of the day's work. Training wild horses requires expert ability and nerves of steel.

cowboy and escapes. Sometimes, too, the steer not only knocks the cowboy down but starts goring him. This happens but infrequently, and when it does the animal is roped by a hazer who rides alongside on a trained horse. But a steer moves quickly, and there have been times when the bulldogger has been carried from the field dead or seriously injured.

The bulldogger races against time. One minute and a half is the maximum allotted him in which to conquer the steer. The man who can turn the trick in half that time, or faster than any of his fellows, becomes the acknowledged champion.

Another thrilling event of the program is the wild horse broncho-busting contest. Fifteen plunging, blindfolded outlaw horses are driven, led, or pushed into the arena in front of the grandstand. At the report of the starter's revolver, cowboys desperately endeavor to saddle the snorting bronchos.

Finally, one cowboy manages to buckle his cinch and mount. But the bucking broncho starts on a stampede in the wrong direction. Then another mounts, and off they go, pitching, rearing and whirling. Finally one rider, by petting, coaxing, pleading, and spurring, manages to bring a bewildered



Two minutes is the time allotted to contestants in the roping and hog-tying contests. Within this time the steer must be roped and three feet neatly trussed together. Top photo shows Mabel Strickland, champion cowgirl, after downing a cow. The steer below has just been hog-tied.

For action and excitement it's hard to equal the steer-riding contest. If you're a good man you stick on clear around the track, and if you aren't —you don't. Horses, too, sometimes object to having cowboys perched on their backs, and take measures to unseat them as pictured in the photo at the left.

and frenzied horse around the half-mile track and under the wire for first honors.

Hark! The announcer is calling, "Ray Bell is about to ride Strawberry Roan, the famous Western outlaw—watch gate two!"

The big crowd roars its appreciation, for Ray is a household hero in a dozen western states. Then — a sudden hush — Ray is "piled" on the fourth jump. The performance is repeated again and again a score of times by various riders; some have either "stuck," "pulled leather," or been "piled," but it is all in the game of picking the grand champion.

Then comes the event that gets our attention—just as exciting—the world's champion cowgirls' bucking contest. Horses used are untamed and fresh from the Wyoming range country.

Oftimes these wild horses do the forward somersault, catching the rider under them as they go over. A man has only one chance in a hundred of getting free from a horse when he starts to go over, since it all happens in the twinkling of an eye, and before he knows it the cowboy has several hundred pounds of horse on top of him, and he is usually injured. Guy Schultze, the famous cowboy broncho-buster, spent five months in the hospital as a result of just such an accident. But he was not discouraged, for he was on hand the next season ready for another thrill.

Edited by A. NEELY HALL

Mr. Hall is author of such well-known handiwork books for boys as "The Boy Craftsman," "Carpentry and Mechanics for Boys," etc. Mr. Hall's latest designs for articles to be built in the home workshop appear each month here.

Plan to Improve Your Backyard or Basement Workshop

IN IMAGINATION I see you fellows at your benches in a wide variety of shops, from a makeshift in mother's kitchen to your own building in the back yard. Extremes, those, and there is usually a difference in the character of the work turned out, reflecting as it does the conditions under which it was done. No doubt some of you must work under adverse conditions, but the years bring changes, so keep a look about you for an opportunity for betterment.

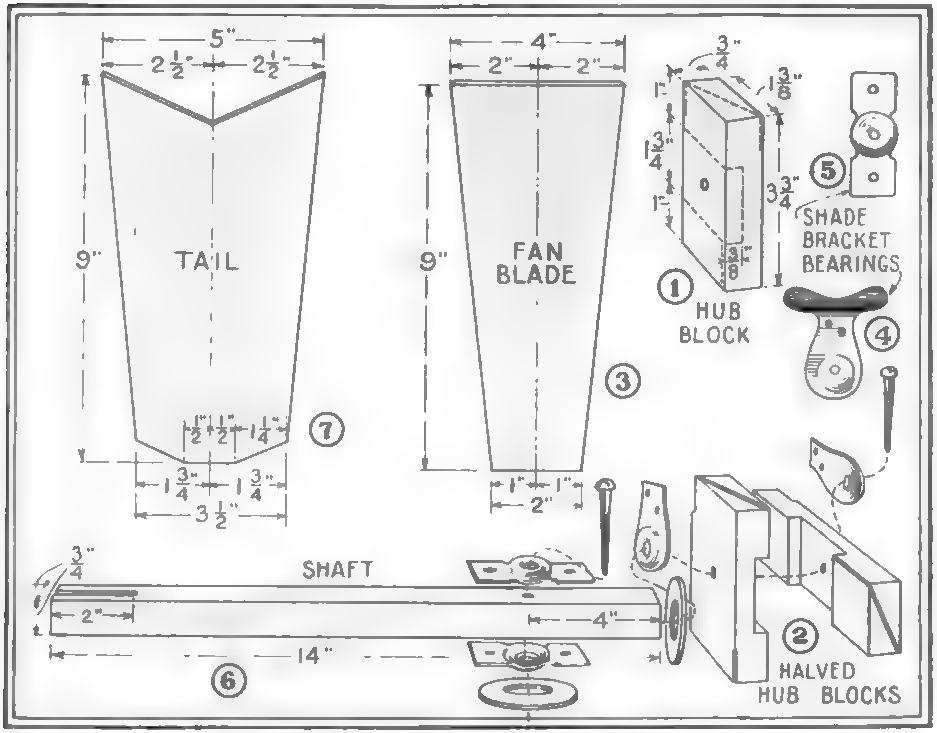
This backyard workshop is typical of hundreds throughout the country which have been adapted to their own use by boy craftsmen.

An outside shop may be the ideal location, if it can be built large enough, with provision for heating in winter. A corner of a heated garage will serve the purpose, too. But probably no place equals a well lighted basement, and there is often room for expansion, as new equipment is added. And who among you isn't keen about equipment—a cabinet of new tools, a circular-saw, a lathe, and some of the other motor-driven, time-saving machines for home shops that are so enticingly displayed in store windows and advertisements?

Plan for the better workshop now. Look upon new equipment as an investment for the future. Talk the matter over with Dad, and with his cooperation many things may be possible.

We should like to hear from more of you. Tell us about your shop, what you are most keen about making, and what plans you would like to have published in the Boy's Workbench department. Are you interested in model airplanes—boats—"rolling stock" such as pushmobiles—just what is it you would like to make in your own shop? Write to the department editor and let him know.

Toy Windmill Motor Acts as Wind Direction Indicator



IT IS fascinating to watch a windmill in motion, and to note the similarity in action of the wind upon its tail and upon the tail of an airplane, keeping the nose of each headed into the wind.

The toy windmill, or air motor, is about as fine a mechanical job as you could want. It is quickly made, and when it has been assembled all you need do is set it up and let it whizz. There is no initial cost, and except for an occasional greasing, no upkeep.

Rig up several of these stationary airplanes in your back yard airport, and exercise your air rights, pending the day when you will take off in your own plane, possibly from the same yard.

The photograph shows the air motor mounted upon a clothes post. If you want it visible from the air as well as from the ground, mount it atop of a chimney, or on the house or garage roof.

Dimensions of parts are given in accompanying diagrams. It might be well to increase these by one-half if the model is to be mounted high, that it may not look too small.

First shape the hub. This requires two blocks of the size shown in Figure 1, halved at their centers so they will interlock (Fig. 2). Halving consists of cutting from one face of each block a piece of the width and one-half of the depth of the other block, so that the pair will interlock with a snug fit. Dotted lines in Fig. 1 indicate the halving. Cut inside of the end lines with a saw, then split out the wood between the cuts with a chisel, and finish smooth with a file and sandpaper. The block ends must be slotted to a depth of 1 inch to receive the blades, and as the blades will be 3/16-inch thick, the slots must be of that width. Cut with a coping-saw or other small saw.

Join the halved blocks with nails or screws, then locate the hub center on each face, and bore a 3/16-inch hole through it.

Cut the four fan blades of the dimensions given in Fig. 3. Draw a center line as shown, from which to lay off the end dimensions. Cut the blades out of box boards.

Action of the wind on the tail vane of this air motor keeps it always headed into the wind, making it a good wind direction indicator for amateur aeronauts.

If the boards are thicker than 3/16-inch, shave off the ends to fit the hub slots. Fasten the blades in the slots with finishing nails.

Next, the hub bearings. Make them of metal, to reduce wear to a minimum. Shade brackets were used on the model, and they have proved excellent. The outside bracket (Fig. 4) can be used if you will hack off or file off the foot as indicated. The inside bracket (Fig. 5) needs no alteration. Place a bracket on each side of the hub, with its hole over the hub hole, and fasten with screws.

Make the motor shaft of a stick of the dimensions given in Fig. 6. Slot one end to a depth of 2 inches to receive the tail, bore a ⅛-inch hole in the opposite end, in which to drive the hub pivot, and bore a 3/16-inch hole 4 inches from the end for the shaft pivot. Fasten a shade bracket on each side of the motor shaft, with the hole directly over the pivot hole, for bearings (Fig. 6). Use screw 2½ inches long for pivots, and place an iron washer between the hub bearing and motor shaft, and another between the shaft and the post you mount it on.

Finish the parts before assembling. Use lacquer or automobile enamel. Red fan blades and tail, and green hub and shaft, make a good combination.

When you have set up the windmill, fill the spaces between the bearings with grease and you will have a silent running motor.

With a little ingenuity you can harness your air motor, by means of spool pulleys and string belts, to operate jumping-jacks and other small toys.

Picture Hook Wire Spreader

WHEN going on a hike you are almost bound to encounter barbed wire fences which must be passed. If you have a pair of picture hooks such as are used in hanging frames from a moulding, you can hook two strands of wire together with each hook and this will leave an opening amply large enough to permit you to pass through.

Horseshoe-Concrete Boat Anchor

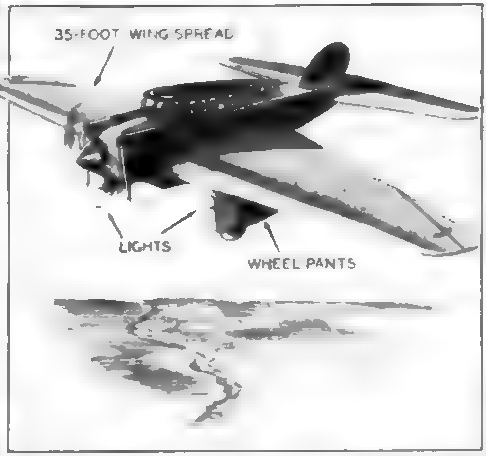
YOU have needed an extra anchor, a reliable anchor, and what better time to make one than an off afternoon given to odd jobs. A gallon-size paint pail, a horseshoe, and enough sand and cement to make a 1, 3, 4 mixture to fill the pail are all that are needed. Fill the can with the mixture, and embed the horseshoe as shown in the photograph. You can use a ring-bolt, or a short length of hammock chain, instead of the horseshoe, and an old kettle makes a good form for a larger anchor.

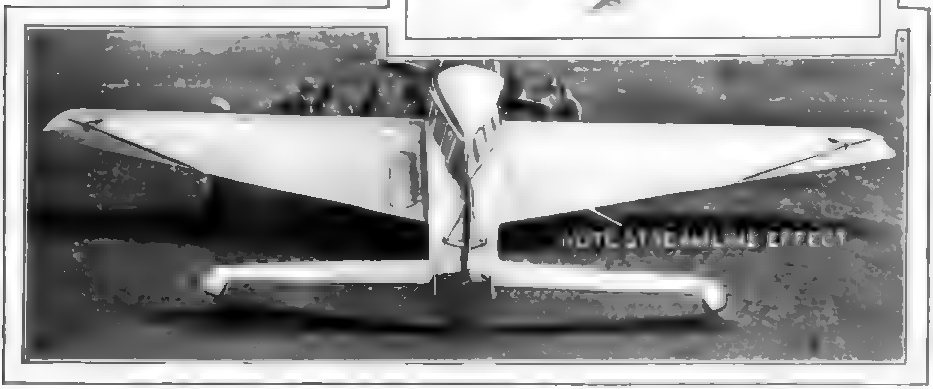
When you are making a concrete anchor for your boat, obtain a horseshoe and embed it in the mixture so that its arched end will act as a handle.

200 M.P.H. *in this Streamlined Plane*

Nineteen Adults and Two Children Testing One-Piece Plywood Wing

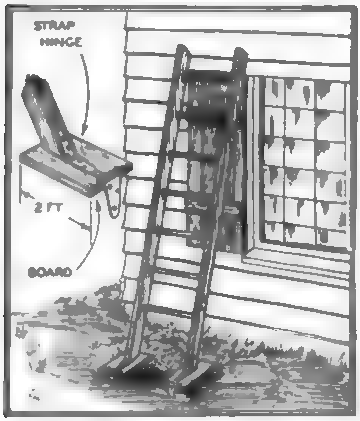
ATTAINING a speed of 200 m.p.h. and making a smooth landing at 40 m.p.h., America's first one hundred per cent streamlined plane was recently given its initial trial in Los Angeles. The wing of the new ship is slung low and has a spread of 35 feet. M. C. Tunison, designer of the plane, claims that the little ship can not possibly go into a tail spin.





The "Scout," as the new plane has been named, reached an altitude of 10,000 feet in its trial flight. It is designed so that it creates the least resistance possible to air currents when traveling at a fast rate of speed. Even the cabin is constructed in streamline effect. The interior is fitted in a palatial manner and has a capacity for three passengers with the pilot. Note how the elevators and ailerons blend into the tail section and wing. Powerful searchlights throw beams from the wheel "pants."

For the Gardener and Home Maker

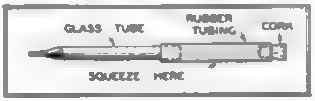


Wooden Shoes Keep Ladder from Slipping

DANGER of accidents resulting from falls when a ladder leaning against a house slips on the soft ground is eliminated by use of wooden safety shoes such as are shown in the drawing at the left. A two-foot board, hinged to the bottom of the ladder leg, provides a broad base which not only supports the ladder securely, but prevents the sharp legs from digging into the ground and disfiguring the lawn.

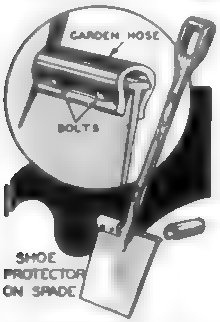
Home - Made Medicine Dropper

TO MAKE an emergency medicine dropper, draw out a piece of glass tubing in a glass flame, fit a piece of rubber tubing to the large end, and insert a cork into the rubber.



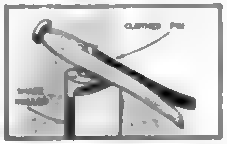
Shoe Protector for Spade

GARDENERS who do considerable spading are only too well aware of the fact that the soles of their shoes are worn out rapidly by contact with the sharp edge of the spade. To overcome this difficulty, a piece of rubber hose, mounted to the spade as shown in the drawing, will be found to serve efficiently. A length of hose is cut to the desired size, slit open, and fastened to the spade with two or more bolts. This attachment will also be found to make the spading work less tiring on the feet.



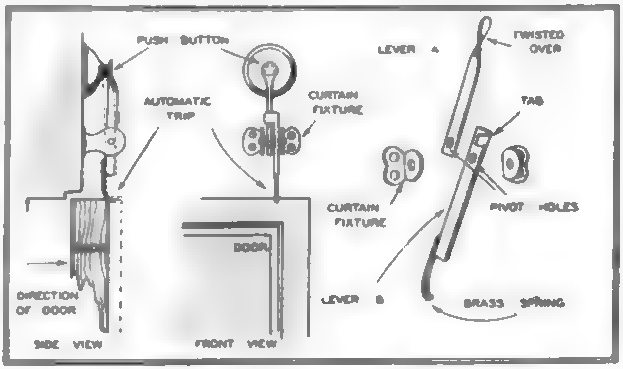
Clothespin Wrench for Shade

A CLOTHESPIN is a handy article to keep within reach for use when the window shade falls or is drawn so far that it locks. Using the clothespin as a wrench by inserting the flat projecting end of the shade roller in the groove of the pin, the shade can be rewound and replaced without the necessity of first rolling up the shade, placing it in the lock, unrolling it and then rewinding. If the shade is locked by being drawn down too far, use the clothespin to move the spring a trifle to permit you to loosen the ratchet.

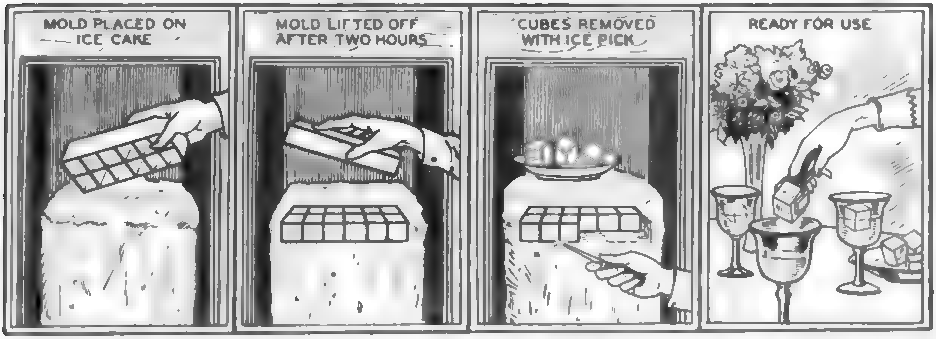


Attachment Gives Warning When Door is Opened

HOUSEWIVES, shopkeepers, and others who desire a warning device to announce when a door has been opened can make one easily by following the plans in the drawing at the right. A brass spring, attached to a short lever which swings on a pivot made from an old curtain fixture, moves the lever when the door is opened and presses the flattened end against the button of an electric bell.



Handy "Kinks" for Everybody

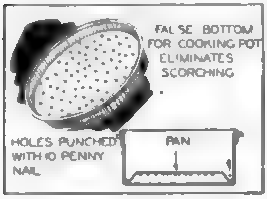


This Handy Mold Produces Ice Cubes Like Newest Electric Refrigerator

HOMES not equipped with the newest electric refrigerators with attachments for freezing ice cubes for cooling desserts and drinks can secure the same effect through the use of the mold pictured above, which has just been placed upon the market. The mold is placed upon a cake of ice as shown and in the course of two hours it will have melted its way into the ice so that, when lifted off, a dozen perfect cubes have been shaped which can be removed with an ice pick ready for use.

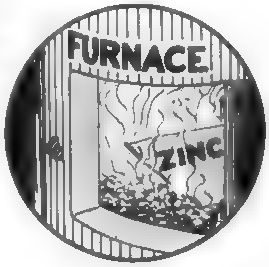
False Bottom Prevents Scorching

FOODS being boiled or stewed frequently scorch when the water boils away, leaving the cooking pot dry. A simple device to prevent this can be made from a pie plate or can cover of sufficient size to fit snugly inside the pot. Punch it full of nail holes so that the steam and boiling water can pass through it. Then if the pot boils dry the food cannot burn, since it is not directly in contact with the heated bottom of the dish. The food may get a bit dry, but will not char.



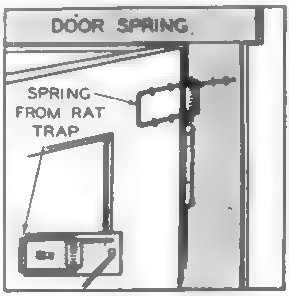
Zinc Plate Cleans Furnaces

A PIECE of zinc makes an excellent soot remover in cleaning furnaces. If the flue will not draw well because it's clogged with soot, build a hot fire in the furnace and place the zinc sheet on the flames. The heat will melt it and the chemical reaction set up will change all the soot to powdery white flakes which will be carried up the chimney with the draft, effectually cleaning the flue.

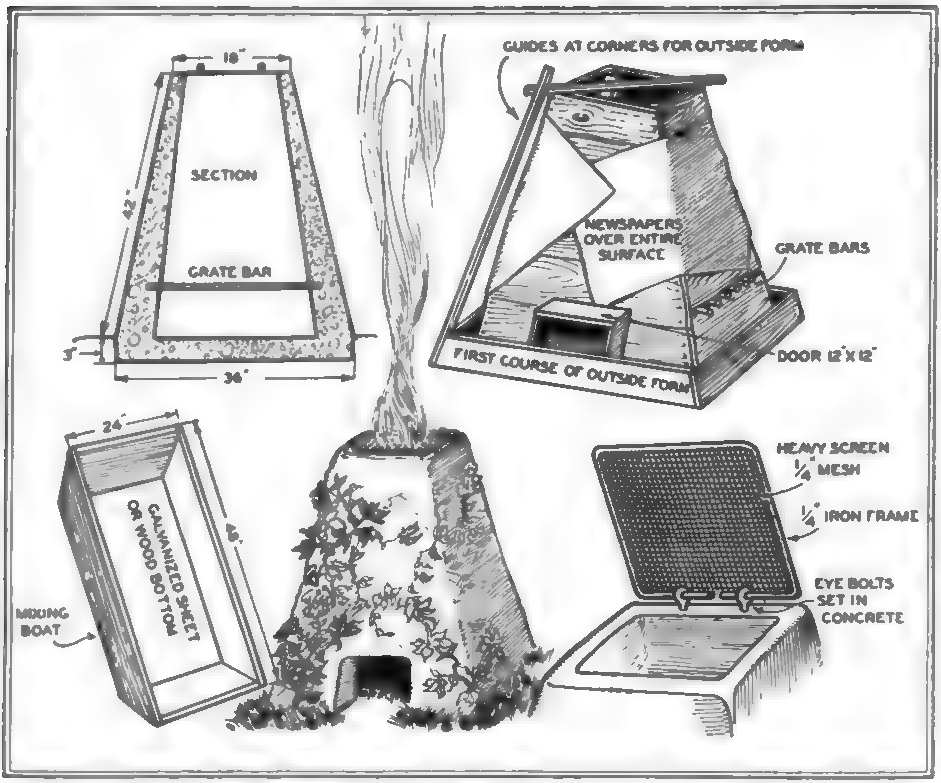


Rat Trap Spring Makes Good Door Closer

AN EXCELLENT door closer which will hold doors shut against slight puffs of wind can be made from the spring of an old rat trap. Simply remove the staples holding the spring to the trap base and mount it on the door as shown in the drawing at the right. It will prove an efficient substitute for the common coiled spring usually attached to screen doors and has the additional advantage of being inconspicuous and out of the way. If one spring is not strong enough to do the job, two or more can be attached to the door.



An Outdoor Concrete Incinerator



A SUBSTANTIAL concrete incinerator with draft sufficiently powerful to consume anything that burns is easily made from these diagrams. First, make a frame in the form of a truncated pyramid, 36 in. square at the base, 18 in. at the top, and about 42 in. high. Use old boards, as you will find it more convenient to burn out the core than remove it. Build a support for the doorway as shown, about 12 in. by 12 in., or large enough to admit a shovel for removing ashes. Cover the entire form with tarpaper or old newspapers so that the fresh concrete will not "squidge" through the cracks.

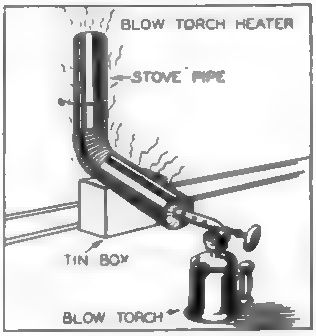
Just above the top door level place iron rods transversely so that they protrude through cracks in the boards two or three inches. These serve as a grate. Lay them about 5 in. apart so that tin cans and other metal will drop through to the ash pit. Around the outside of the base build the first section of a form to make the walls 6 in. thick at this point. Continue this form on up as you proceed with the concrete work, following guides at the corners so that the taper of the wall will be uniform.

A "mixing boat" for the concrete is easily made as shown and will greatly facilitate the mixing. Six parts of sand-and-gravel to one of Portland cement and enough water to mix thoroughly will give the required strength.

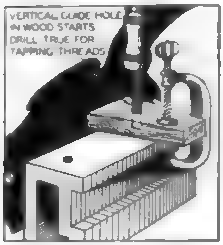
For the spark-guard cover bend a ¼ in. iron rod into an 18 in. square, slip two eye bolts on one side, space them about 10 in. apart, and then cover the frame with ¼ in. mesh galvanized wire screen, the heavier the better. Bend the edges over the frame and wire securely. The shanks of the eye bolts are to be set in the top of the concrete wall.

Items to Interest the Home Mechanic

Blowtorch and Stovepipe Heat Room



ALTHOUGH an ordinary blowtorch gives off clean, sootless heat, it is not of much use in warming a room unless its flame is spread by some radiating surface. A length of stovepipe will serve admirably. Attach an elbow as shown so that the pipe can be mounted on a slant to secure an updraft. A tin box or metal mounting should be used to secure the pipe and avoid danger of fire. Set the torch so that its flame is directed into the lower opening of the pipe, and it will be found that sufficient heat is radiated to warm a small building such as a garage or hen house. The pipe can be secured to the wall with a length of wire.

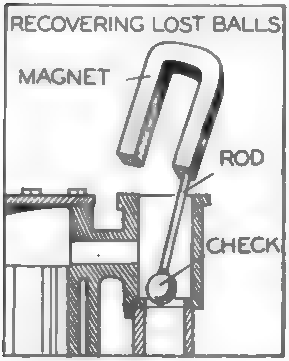


Wood Guide Insures Accuracy in Tapping Threads

WHEN tapping threads into holes which are drilled by hand it is almost impossible to start the tap so that the thread goes straight when the holes are not absolutely perpendicular, as is often the case. Take a wooden block with a vertical guide hole in it, clamp it to the work as shown, and a straight job will result.

Sawdust Can Soldering Torch

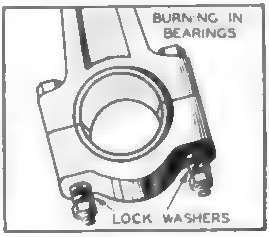
A GOOD torch for heating a soldering iron can be made from an old tin can which has been filled with sawdust soaked in alcohol. This fuel burns with an intense flame similar to that of the familiar canned heat, except that it is hotter. A wire support for the iron can be attached to the can, or the lid may be turned back and a slot cut to hold the handle.



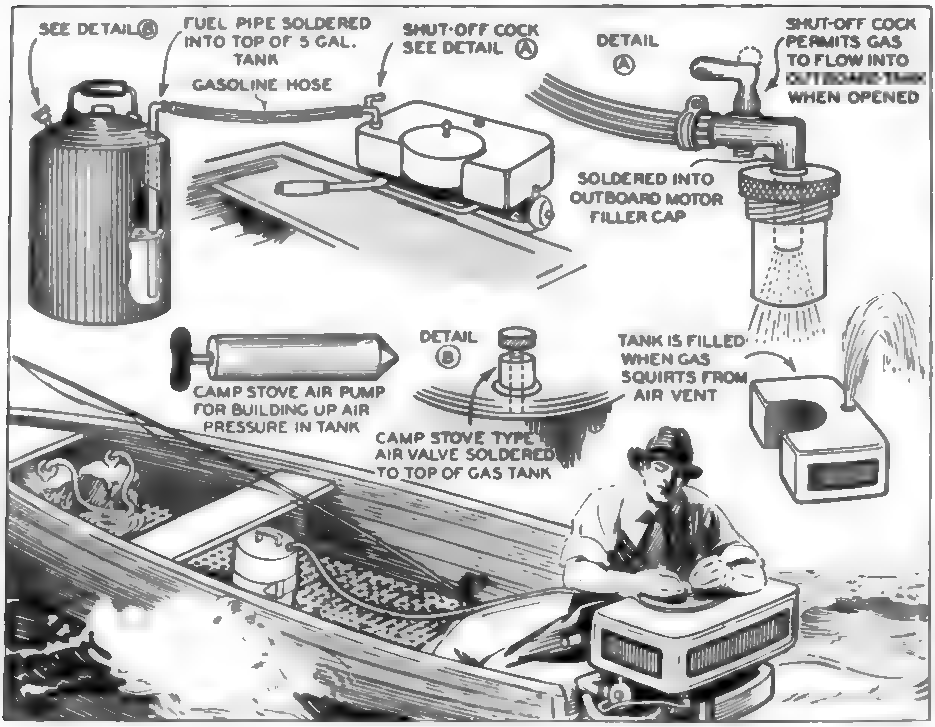
Magnet Recovers Inaccessible Motor Parts

IF YOU have ever taken down an engine you have probably undergone the annoying experience of dropping some small object into the crankcase which meant removing the whole pan to recover it. The steel ball check from a carburetor is also a difficult item to remove unless one uses a device such as is shown in the drawing at the left. A magnet taken from a magneto will transmit its magnetic strength through a screw driver or a piece of soft iron brazing rod so that when the tip is placed against the object to be recovered, it will cling to the metal and lift easily. The magnet can be carried in the tool chest; it will make itself useful in many ways.

Lock Washers Help in Burning in Bearings



THE USUAL process of burning in bearings requires that stops be made frequently to tighten up the bearings. This may be done away with by fitting extra length bolts to the connecting rods and underlaying the nuts with lock washers. These washers exert a spring effect which will keep the bearing drawn up while it wears smooth. As a short cut and time saver, this little kink will prove invaluable.



Outboard Motor Refueling Tank Prevents Fire Danger

THERE are probably several hundred thousand users of outboard motors who have been handicapped or inconvenienced by the limited fuel capacity of the tanks with which these motors can be equipped. Obviously, the manufacturers who must build such portable boat motors within certain space limitations, cannot provide them with larger fuel tanks.

As a result, the outboard motor boating enthusiast who uses his outfit for trolling for fish, for extensive cruising, and speed contests, finds the usual 3-quart or 2-gallon tank something of a nuisance. A great many outboard motor users have learned to their sorrow that refueling an outboard motor by the usual methods and without stopping the motor, entails a terrific fire hazard.

The writer struggled with this problem for several years, and tried various re-fueling schemes before working out the one illustrated above. This device works to perfection. I can now refuel my motor without stopping and without the slightest danger of starting a fire.

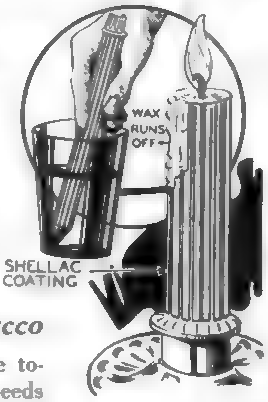
By carrying the 5-gallon pressure tank in my boat, and connecting it with the motor before leaving shore, I can cruise or fish all afternoon without ever stopping the motor. Moreover, my danger from fire is even less than that of the outboard motor user who spills gasoline around through his boat with a measuring cup and funnel —even though that operation is done while tied up at the boat landing!

Very little air pressure is required in the storage tank to move the fuel from the tank to the motor. A few strokes with the small hand pump is entirely sufficient to handle the whole 5 gallons of fuel in the main supply.

Simple Devices You Will Find Useful

Shellac Coating Makes Wax Candles Last Longer

CANDLES may be made to give longer service if they are dipped in shellac before using. Two coats of shellac will prevent the wax of the candle from running over the edge when the heat of the flame melts it, since the shellac itself burns more slowly and forms a well which holds the wax until it is burned. Everyone is familiar with the way in which wax from an untreated candle runs down the side and collects at the base where it is mostly wasted. The shellac coating also helps the candle to burn evenly.



Apple Peel Moistens Tobacco

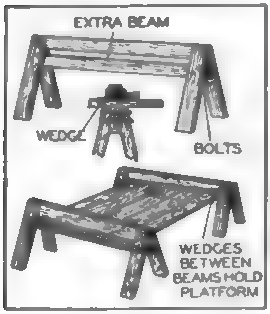
SMOKERS often find that the tobacco they carry in tins needs moistening. It is impractical to keep a moist rag in the can and it is also difficult to control the humidity with such a device. An old Canadian woods trick is shown in the drawing at the left. The paper lining of the can is pushed aside and a few slivers of apple inserted, preferably with the peel on one side to retain the moisture. In a few hours' time the tobacco will have absorbed sufficient moisture from the apple slices to be perfectly conditioned. Do not leave the apple too long in the can or it will mildew.

Paper Plate Makes Good Drip Catcher for Paint Cans

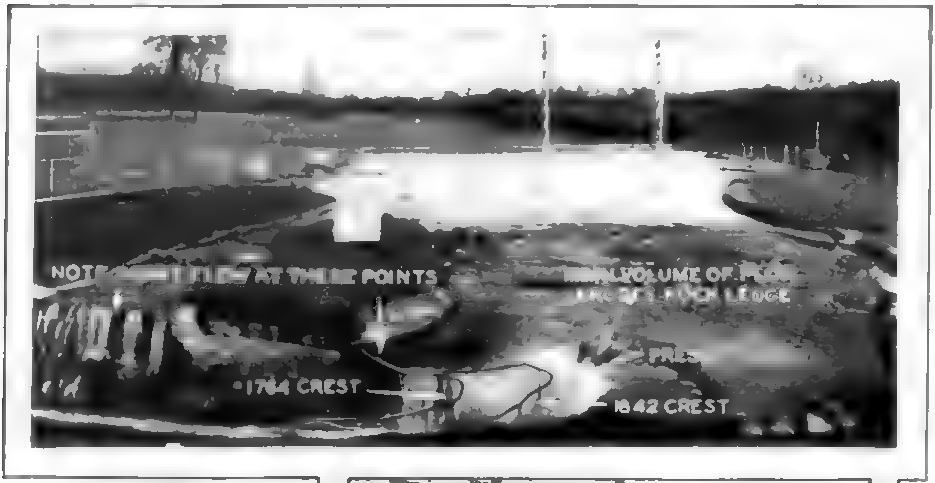
USUALLY it is necessary to place newspapers beneath the paint can to prevent drippings from spattering the floor. A more satisfactory method is to take a paper plate of the ordinary picnic variety and glue it to the bottom of the paint can. The edges will project sufficiently to catch any drippings running down the side of the can, and since the plate adheres firmly the pail can be picked up and carried about to any part of the room without marring the floor when it is set down. The plate can easily be removed if the contents of the pail are not entirely consumed and it is stored away on a shelf.

Saw Horse Platform Made With Added Beam

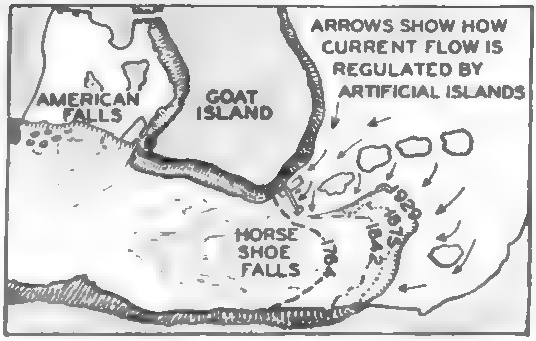
WHEN sawhorses for construction work are being built, the addition of an extra beam beneath the top crosspiece will adapt the sawhorse for supporting a low platform. The drawing at the left shows how this is accomplished. The distance between the two cross beams is just sufficient to admit a length of 2-inch lumber. Two horses are placed in position and half a dozen planks inserted between the beams. Wedges are then driven in between the beams and the planks and the completed platform is remarkably sturdy and solid. The platform is of just the right height to allow carpenters to work on ceilings. It also makes a convenient workbench.



Saving NIAGARA for the



To demonstrate graphically the process by which Niagara Falls is gradually eroding itself out of existence, the scale model of the falls shown above has been built. Note how the main flow of the stream is concentrated at the V of the Horseshoe Falls, wearing away the rock ledge. By comparison with the 1764 and 1842 crests of the falls, it will be seen that in a few thousand years the Falls will degenerate into a mere rapids.



Observe how the placing of artificial islands above the Horseshoe Falls, and the building of a weir from the Canadian shore of the river, has caused an even flow of water across both Canadian and American falls so that erosive action is greatly retarded.

WORLD

Is Niagara Falls doomed to destruction by the erosion of its own rushing waters, which threaten to reduce it to rapids? An international agreement to save the Falls by construction of submerged weirs in the upper river has recently been entered into between American and Canadian commissions.

This familiar view of Niagara Falls pictures a natural beauty spot doomed to disappear unless measures to protect it from erosion are taken. American Falls is in the immediate foreground, with Horseshoe Falls in the distance.

WHAT'S going to happen to Niagara Falls? As far as the ordinary person is concerned, nothing is going to happen to Niagara—it's a permanent fixture of the natural world, like Mt. Everest, the Mississippi River, or the Rocky Mountains. And of course Niagara is not going to vanish suddenly—here one day, gone the next. But the forces of erosion which created Niagara have now combined to destroy it, and the ledge of the beautiful Horseshoe Falls over which most of the river flow passes is crumbling away at a rate which threatens to transform the falls into a rapids in the course of a few centuries.

The scale model shown in the photos on the opposite page give a good idea of the destructive action of the water, and indicates how engineers propose to construct remedial islands and weirs which will have the effect of distributing the flow of water evenly over the entire falls, thus checking the erosion to a great extent. The artificial islands, placed as shown, break up the full force of the current which normally concentrates itself at the V of the Horseshoe Falls, and thus a greater volume of water is diverted to the edges of the horseshoe, over which the flow is naturally scant.

To insure an adequate flow over the American Falls, a weir built out from the Canadian shore as shown would divert sufficient volume even if the flow of the river were reduced by using more of the water for generating electricity. The weir itself would be invisible, since it would be covered with five feet of water.

Instead of constructing artificial islands, an alternate suggestion for insuring an even flow over Horseshoe Falls is to deepen the channel along the Canadian shore and along Goat island, leading a greater head of water to parts of the ledge which are normally almost dry.

This latter method is the one favored by engineers who will have charge of the actual construction work when Congress ratifies the agreement recently signed by William Mackenzie King, Prime Minister of Canada, and William Phillips, American Minister, authorizing construction of the remedial works recommended by the International Niagara Board. Cost of the works is estimated at $1,750,000 by Maj. Robert S. Thomas of the United States Army Engineering Corps. Although the engineering features seem spectacular to the layman, there is nothing impractical about them and construction problems will not be difficult.

Powdered Coal Reduces Cost of Operation of Railroad

Gives Sound Effect of Streets

"I'M WILD about horns . . ." runs the refrain of a popular tune. And evidently Josephine Dunn, movie actress, must be, for she gets quite a "kick" out of playing a melody on this horn-organ, shown below, that is part of the equipment of the Universal Studios to give street effects for sound pictures. All types of automobile horns imaginable are mounted together and operated by an organ keyboard. They are connected according to scale, and it is possible to play any piece desired.

Josephine Dunn, movie star, playing the organ.

UTILIZING pulverized coal as fuel, this new engine shown above is one of two that were recently built in Germany for experimental purposes. The powdered coal is blown by fans from the tender to the firebox, and in tests that have been made the engine has performed above the highest expectations of the designer. Development of locomotives of this type means that cheaper fuel can be used in the operation of trains. Accordingly, rates can be lowered to compete with the competition which buses and automobiles are giving railroads all over the world. The tender is filled with coal dust in much the same manner as water is poured into the tanks.

Postpone Irrigation of Sahara

PLANS for turning the Sahara desert into a rich agricultural territory by means of diverting waters of the Mediterranean sea into depressions of the wasteland have been postponed for some time due to the death of the man whose idea and capital furnished the incentive. Dwight Braman, prominent American financier, was recently stricken with heart attack and died. It was his intention to begin the work of letting the sea into the desert this fall. American engineers and machinery were to be used, and following his return from Algeria before his death, Mr. Braman was highly enthusiastic of the possibility of making the "Sahara blossom like a rose." Some of Mr. Braman's friends are considering taking over the plans for the project.

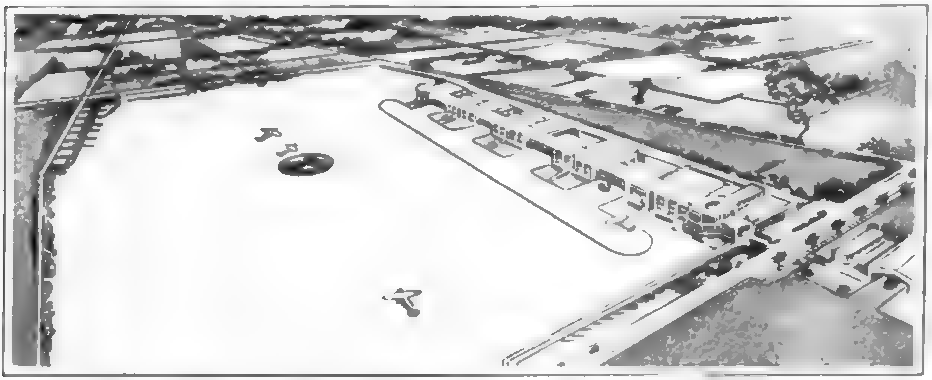
All the Comforts of Home Aboard This Luxurious Plane

LOUNGE, writing desk, refreshment stand, and a number of other refinements are provided in the interior of the luxurious new twin-motored Sikorsky amphibian recently delivered to John Hay Whitney, New York capitalist. A photograph of the passengers' cabin appears at the right. The pilot's compartment is closed off from the main cabin in much the same manner as an enclosed drive limousine, muffling much of the objectionable engine noise. Windows can be raised or lowered at will when it is desired to talk with the pilot. A duplicate altimeter and air speed indicator, mounted between the windows at the forward end of the passenger cabin, tell the occupants of the plane what the ship is doing at all times. The Sikorsky is equipped with two motors and attains fast climbing speed.

Can Reach Chicago's New Airport in 30 Minutes from Loop District

OCCUPYING a key position in the national chain of 25 airports established at strategic points throughout the country, the new Curtis Flying field, shown below, that has recently been built in Chicago, Ill., is located only 30 minutes from the loop district in the city. Hangars, an administration building and dormitories for student pilots have been built on the site, which covers 430 acres.

Long concrete runways provide safe manipulation of planes, and concrete floors in front of the hangars make taxiing easier. In order to segregate the field the airport is divided into two sections. One large division of 300 acres is devoted to commercial operations, including storage, mechanical service, maintenance and general flying. Adjoining the larger piece and separated from it by Lake Avenue is a 130 acre tract that is used solely for student training. The airport was formerly farm land and presents few of the difficulties encountered on most fields.



The new Curtis Airport in Chicago, Illinois, is divided into two fields—one for commercial use and the other strictly for training pilots. Hangars are built on both fields and dormitories are provided for student pilots to live in while in school. The two fields are divided by a paved street.

"Home, James!"—Chimpanzee Acts as Owner's Chauffeur

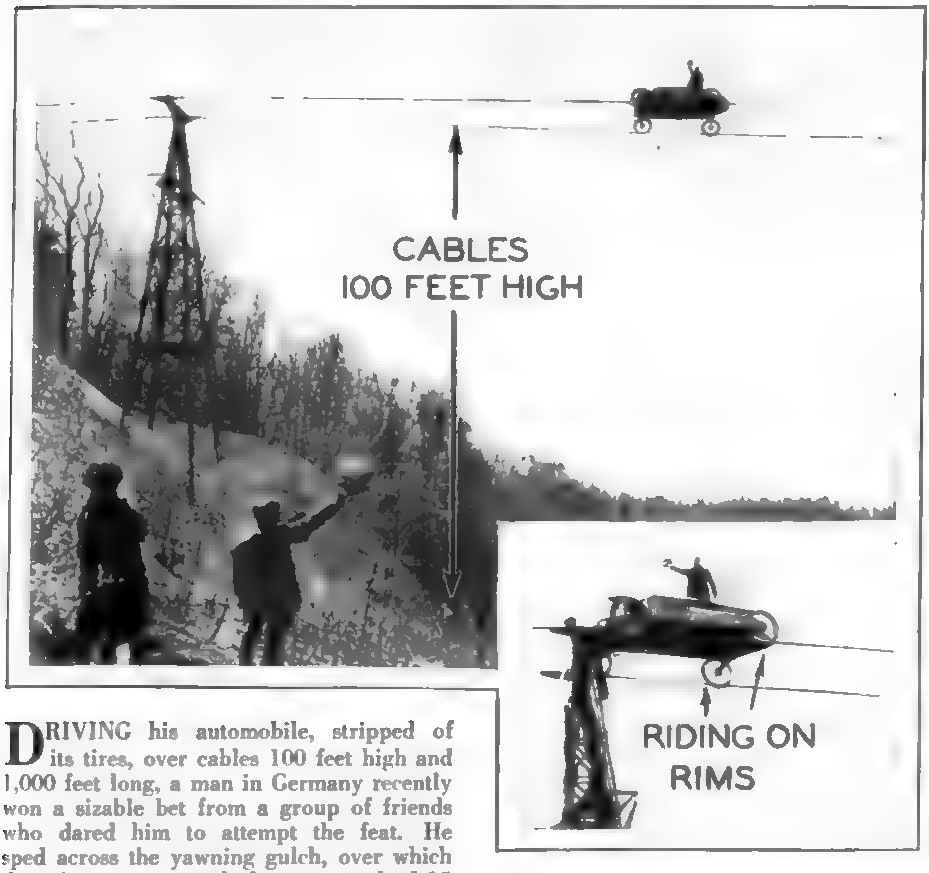
"STEP on it, I'm late for dinner." That's what the owner of this car at left tells his pet chimpanzee, who can really drive the automobile in a capable style and understands directions perfectly. James, who was renamed to conform with the discovery of his driving ability, sits proudly in the seat and guides the car through traffic. He learned by watching his owner. One day he climbed in the car and drove it off. Everyone expected to find it parked on a telephone post or in a ditch. However, the new driver pulled up in front of the home and stopped the car.

Comparing a "Peanut" Plane with Novel Pusher - Type Monoplane

RECOGNIZED as one of the smallest practical monoplanes in existence, this tiny "peanut" plane shown under the wing of the larger ship is equipped with a 40 h.p. Scorpian two-cylinder motor. It is only 17 feet in length and has a span of 25 feet. Its weight empty is 468 lbs. and 750 lbs. loaded. The little ship makes a maximum speed of 86 m.p.h. and has a cruising speed of 70 m.p.h. It lands at 45 m.p.h. The initial rate of climb is 450 feet per minute, and it is capable of reaching an altitude of 9,000 feet. The fuselage is a rectangular structure with a domed roof. It is built of spruce and divided into nine bays by vertical and horizontal struts. The large plane above it is of the pusher type. That is, the engine is behind the pilots' cockpits and the propeller pushes the ship through the air rather than pulling it. This adds to the comfort of passengers in regard to silence, smell and view, but is more dangerous in event of a crash.

These two strange appearing planes were recently demonstrated in London before a group of experts.

Winning a Hazardous Bet Driving Car on Shaky Cables



DRIVING his automobile, stripped of its tires, over cables 100 feet high and 1,000 feet long, a man in Germany recently won a sizable bet from a group of friends who dared him to attempt the feat. He sped across the yawning gulch, over which the wires were stretched, at a speed of 15 m.p.h. The top photo above shows him waving as he neared the end of his perilous "journey." "It was great fun," he announced when he descended. The car was hoisted to the cables by a huge derrick used in a nearby limestone quarry. The pneumatic tires were first removed so that the rims would afford a means of keeping the wheels of the car on the heavy steel wires.

Device to Reduce Rail Crashes

PRESSURE of a button in the office of a Swedish railway station sets pendulums swinging on either side of the track in the yards and automatically stops an incoming train. The released pendulums connect with levers on the under side of the approaching cars and apply the air brakes of the entire train, making it stop short.

Coeds Grow Deft With Tools

GIRL students recently invaded the final stronghold of men on the campus of the University of Minnesota when a course in foundry work was offered to mixed classes. Women there are being trained in an elementary course in pattern practise.

Garbed in thick smocks and wearing gloves to protect their hands, the girls in the course learn how to manipulate saws, chisels and similar tools. Rudiments of furniture-making and decoration and applying a finish to articles constructed in class are conscientiously learned.

When a coed student has finished the course, she is as capable with tools as men in the department. Simple problems in construction are attempted first, gradually combining the work into more complex forms.

GOLD *is*

These 11 nuggets make a nice nest egg. Largest is worth $720.

EVER since the first cave-man found a glittering nugget, discovered it could be hammered and worked, and would keep untarnished and unharmed by time or elements, men have searched the globe for gold. Much of this country's wealth and progress is directly due, say economists, to James Marshall's gold-find of January 19, 1848, in the millrace of Sutter's Mill, California. Within a few years were found the great fields of Australia, Alaska, South Africa and other lands. Some years ago John E. Hammell, now one of the leading mining men of the north, grubstaked six prospectors for a winter's search in Manitoba. They found an outcrop, he told me, but were almost convinced it was worthless, mere sulphides. Finally

Typical scene from a hydraulic mine. The tremendous pressure of the water washes away whole mountains.

Above is shown an ore dredge at work, washing the gold out of sands which have been exhausted of their richest gold deposits by forty-niners, but which still contain sufficient "dust" to make large-scale operations, such as these, profitable. Waste water is ejected through the pipe in foreground.

Where You FIND It!

By ORVILLE H. KNEEN

Ask an old prospector where you will be likely to discover gold and he will answer, "Gold is where you find it." Mr. Kneen, a mining engineer, tells here just how to go about the fascinating business of finding a gold mine, and how to recognize one when you find it.

This scene shows how Alaskan miners built sluice boxes to wash out their gold in the Klondike.

they sent for a geologist, who soon found that it "looked good." Several years passed before the location was "proved" and capital interested. Extensive tests showed millions of tons of copper and zinc, in addition to gold! Six years after the first discovery, when a large syndicate took it over, each of the four surviving prospectors received $100,000 apiece—a golden reward for knowledge, for keen eyes and laborious work in distant parts.

"Free lance" prospecting is less widespread today, but parties of two or more, with a trained geologist to direct field activities, decide upon the kind of minerals to seek, the region, time, etc., are on the increase. The "easy strikes" have been mostly picked up. The fortunes of the future will come more largely from low-grade ores, such as the "old-timer" was likely to ignore or fail entirely to recognize.

"Don't pass anything," advises Max W. von Bernewitz, of the U. S. Bureau of Mines, "with the thought that it could not be of any value. Always examine arid regions, contacts, colored or stained rocks, clays, eruptive areas, faults, dikes, schistose rocks, dry lakes, hot springs, oil films, oozing or tarry matter from rocks, incrustations, manganese and iron outcrops, black sands, heavy minerals in panning, outcrops near water catchments and lakes, receding glaciers, and the like."

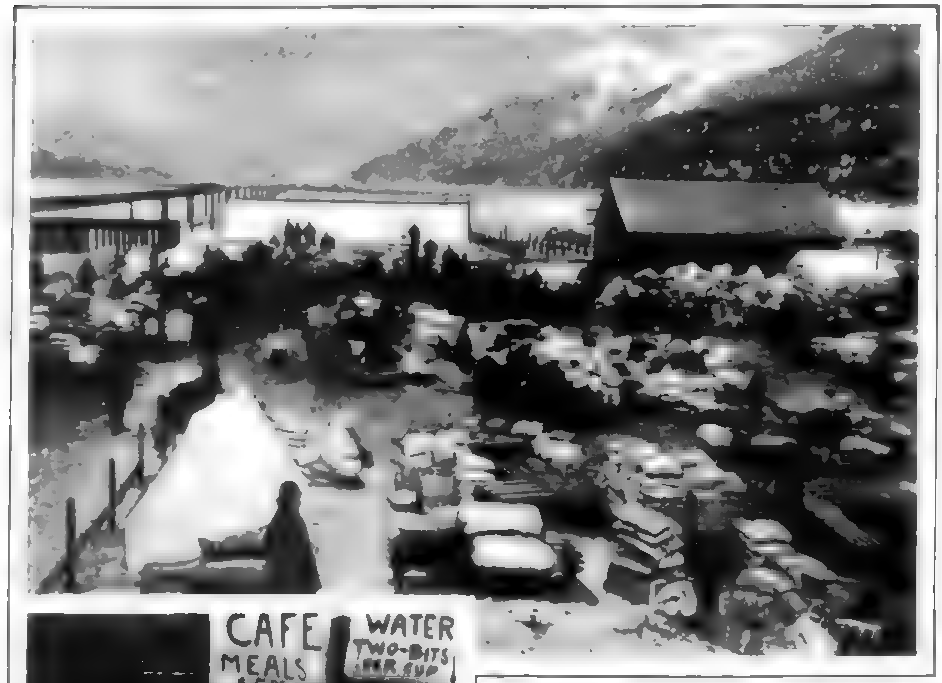
Volcanic Regions Rich Prospects

It is evident that the successful prospector must have good eyesight, able to note instantly a change in conditions. He knows that volcanic regions are among the best to explore. Faults, caused by slipping at some weak point in earth and rock, leave pockets where minerals have been forced or precipitated. Heat and cold, acting directly on exposed rock in desert regions, often reveal minerals.

"The first thing to look for," says von Bernewitz, veteran of 20 years of gold hunting, "is 'float': bits of mineral and vein-matter broken by frost or other agencies of erosion from an outcrop. Or the prospector follows traces of insoluble metals such as gold, or insoluble minerals. He hunts for these fragments first in gullies and valleys to which rain, rivulet and river are likely to have brought them.

"He follows them upstream as far as they continue, then he traces their migration up adjacent hill-slopes until he can find no more, which indicates he has gone beyond their source. As he looks about he may find the outcrop from which they came; if not, he digs and makes a trench across the line of movement of these promising pieces.

"The seeker of gold and silver looks for an outcrop of quartz, because quartz is usually, but by no means always, the matrix of the precious metals. If quartz is iron stained it is a good sign, because minerals containing iron, notably pyrite and chalcopyrite, are commonly associated with gold and silver. Galena is present in many



Old-timers who took part in the Klondike gold rushes will recall scenes similar to the one above which illustrates the freight depot at Dyea, Alaska. Here the old sourdoughs outfitted for their prospecting trips. At the left is a modern-day gold-rush scene from Weepah, Nevada, where gold was found several years ago. The find soon petered out.

quartz veins and is nearly always a good sign for gold, as in California."

First of all, the prospector must know gold when he sees it. He must know that native gold weighs from 16 to 19 times as much as pure water (the latter being closely 62½ pounds per cubic foot). He must know that the pale-to-deep yellow color is the same from every angle of sight, unchanged after scratching or melting. He will hammer a nugget—gold will stand the blows indefinitely. He will test it with nitric and hydrochloric acid, which will not affect gold. But it should dissolve readily in "aqua regia"—a mixture of 3 parts hydrochloric to 1 part nitric acid.

The simple "Lincoln's Test" is often used, in which suspected grains or fragments are rubbed on a piece of chamois covered with mercury. Gold will amalgamate with the mercury, and turn white. The natural compounds of gold—tellurides—are more difficult to detect. From such compounds as "calaverite" at Cripple Creek, Goldfield, Western Australia, etc., some 40% of gold is recovered.

One simple test for telluride is to put a little ground-up material into a test-tube, adding strong sulphuric acid. Tellurium, if present, will cause a reddish-violet color, releasing heat. When cool, addition of water will cause the color to disappear.

Gold has been found in almost every kind of rock, even to limestone, as in the lodes at Manhattan, Nevada, and the Nickel Plate

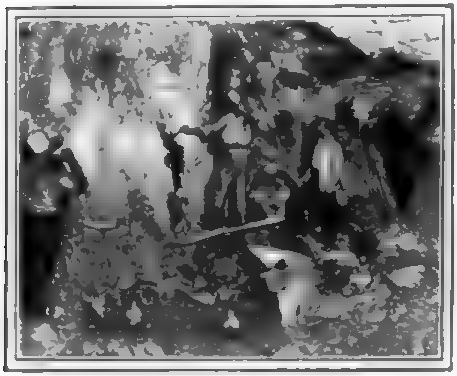
mine of British Columbia. Metallic ores usually occur in veins, the accumulation of concentrated minerals in fissures. These are often caused by volcanic action, molten rock, granite, etc., being forced up from below, into sedimentary rocks such as shale, sandstone, limestone, etc. Earth movements also fold the strata.

It is for such evidences of cataclysms that the prospector seeks, for into such fissures the more or less refined gold has often flowed. Very likely places are faults and points where hills and mountains have been forced up through stratified rock. Such faults in past ages were the easy circulating channels for mineralized waters, and there they deposited their heavy contents.

Flowing Streams Erode Veins

Placers are caused by stream action on eroded veins, often high in the mountains. Flood-waters break up the veins, releasing nuggets and flakes, which are moved down the valleys. Ancient river-beds in California were often covered with layers of lava from volcanoes, and may not be easy to trace. Yet in the first five years after Marshall's discovery of flakes (not nuggets), almost a billion dollars was taken from Southwest placers.

"Many hundred million dollars," says F. A. Goodale, of the Colorado School of Mines, "remain locked up in the ancient river 'channels' of California, to be kept there forever, unless some wonderful plan is worked out to handle the enormous deposits economically. Modern dredges have revolutionized the handling of low-grade, uncemented gold deposits, but the bulk still remains in a cemented condition."



What the inside of a gold mine looks like. Miners at work in Mount Boppy mine, Australia.

If you are planning to hunt for a gold mine, this map shows the areas of the continent where you are most likely to find it. The black portions represent areas which were uncovered by ancient glaciers and which are rich in minerals.

Panning is the first test after a likely spot is found. The modern gold hunter, finding "colors" in his pan, weighs out a fair sample of pay dirt, grinds it to pass an 80-100 mesh screen, washes out the light material in panning. Then he shakes his pan, removing pebbles by hand, until the residue includes only gold and black sand. Weighing the gold tells him with some accuracy the value per ton of pay dirt.

Another test is to add mercury to a panful of dirt, and then heat it on a shovel until the mercury is driven off, leaving a button of pure gold. The fumes are poisonous, and there are various better methods, which recover the mercury for further use.

If the pay dirt looks good, the prospector looks for parallel veins, determines the dip or "strike" of ore veins or zones so that all possible mineral area may be included in his claim. Alluvium, slides of rock, or frozen muck, may hide outcrops. Thus the great Mother Lode of California, a hundred miles long and producer of millions, had no promising quartz outcrops, and there were few at Cripple Creek, Colorado.

Ants, gophers, squirrels and other burrowers often bring out pay dirt from their holes. It was such debris from a gopher hole that led two youths to the recent Wee-

Heavy Weight of Gold Causes Dust to Settle to Bottom While Panning

Two miners, using the old sluice box method of recovering gold from ore, are shown above. At the right is shown the largest nugget of pure gold in America. It weighs five pounds and has a mint value of $1,648. It was discovered by two California prospectors working an abandoned mine.

The miner above demonstrates the process of panning gold. The ore sands are put in the pan and water is poured in. With a circular motion of the hands the water is gradually sloshed out of the pan and the gold dust collects in the bottom of basin. Care and patience are necessary.

pah, Nevada find, which has since "petered out."

K. W. Fritzsche, mining engineer of Canada, tells how to stake out and prove up a claim. His advice applies anywhere. Boundary lines, he notes, should run as nearly north, south, east and west as possible. The discovery post should be where the quality of ore is well shown, and should show name of locator, number of his license, and date. No. 1 post should be at the northeast corner. In Canada filing must be made within fifteen days of date of location.

A geological sketch of the surface is the prospector's next step, showing contacts, shear-zones, dikes, veins, dips and strikes. Mapping is done by running a series of parallel lines, 200 to 300 feet apart, at right angles to the general strike. A geologist puts in the notes as two men chain these lines with a 200-foot steel tape. A pocket compass of prismatic "sight" type, needle floating in oil, is best. Trenches are dug to bed-rock or 10 feet deep, swept clean, and sections sampled by chipping out cross-channels 3 inches wide and half an inch deep.

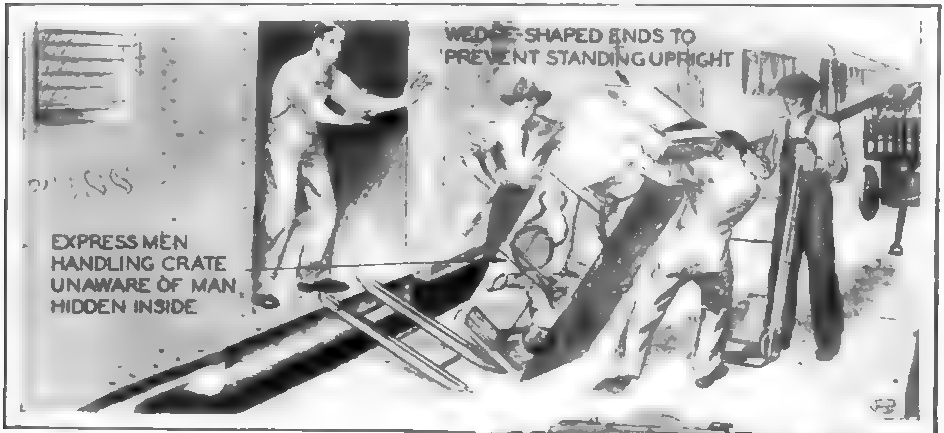
The prospector who can locate and accurately sample such a deposit, for preliminary study, is a valuable man, easily able to obtain a grubstake for a winter or summer gold hunt. Scores now go out each year, fully equipped, and knowing that if they make a good strike, they will receive a liberal reward.

Knowledge of outdoor life, climate and weather conditions, the supply of water in arid regions, use of pack animals, and so on, come best through actual experience. "Hooking up" with a good man soon gives this essential training for a hard, rough life in remote places.

Canada is one of the best regions for the modern prospector. Alaska has many untouched areas. U. S. Geological Survey estimates $360,000,000 in the placer reserves of Alaska. Placer deposits are found from Alaska and Yukon Territory to California's black sands, from Australia to South America.

Science is aiding in the detection of ore, through magnetic, seismic and acoustic (reflected earth- or sound-waves), gravitational and electrical apparatus. Subsurface geology is being studied from the surface. The prospector who would make a fortune would do well to study some of these methods.

Ships Self in COFFIN to Get Into Movies



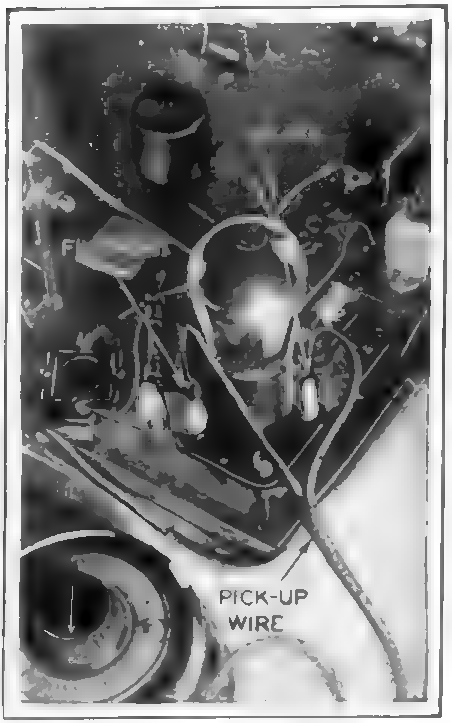
CHARLES LOEB'S unique way of trying to get past the guards of a moving picture studio for a chance to break into the movies nearly cost him his life recently. The comedian had himself expressed in an especially prepared coffin from Chicago to Hollywood. The outside of the box was labeled, "Statue—handle with care—value $500." Loeb went three days without water or food and was in a critical condition when found. Carefully concealed air holes permitted him to breathe freely, but his water supply and food were soon exhausted. The wedge-shaped ends of the box did not permit anyone to stand it on end.

Sparks from the Radio Editor

Edited by CHARLES MAGEE ADAMS

Hints for obtaining the best service from your radio are presented in this department every month by Mr. Adams. He is a recognized leader in the field of radio and his long experience qualifies him admirably to advise Modern Mechanics' readers on the operation of their sets.

Getting More Volume From the Phonograph Pick-up



The method of connecting the phonograph pick-up with the audio system of a radio receiver, with the detector tube included in the circuit, is pictured above.

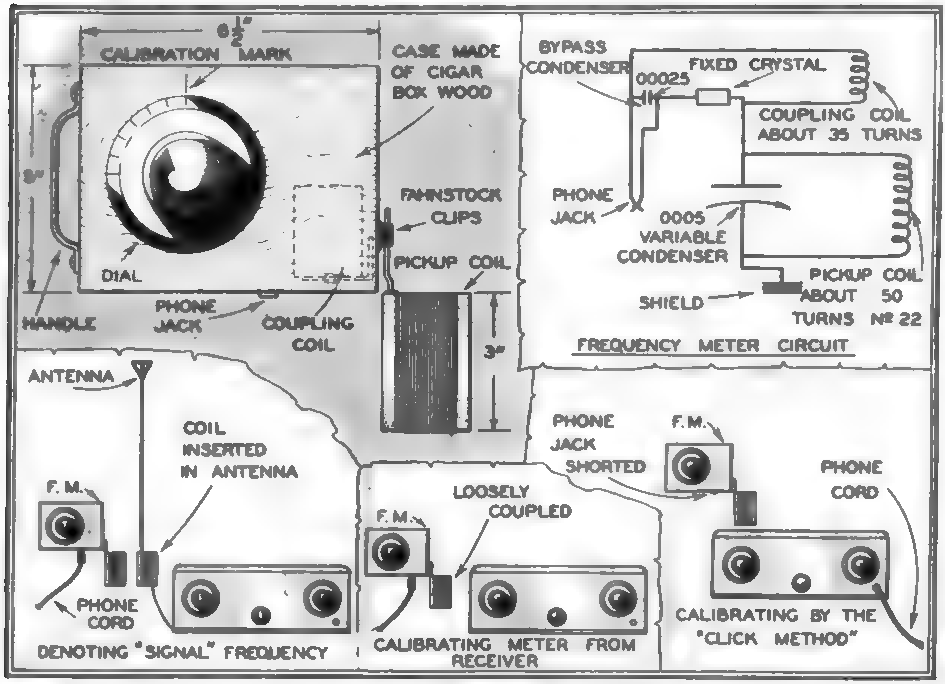
WHEN an electric phonograph pick-up is used in conjunction with the audio system of a radio receiver, more volume will be obtained if the detector tube is included in the circuit.

Nearly all electric pick-up arrangements have a pronged plug which is inserted in the detector socket in place of the tube. Two wires leading from the plug are connected with the pick-up device. The plug connects one terminal of the reproducer with the plate prong of the detector tube socket, and the other terminal with the filament circuit, usually positive side.

In order to take advantage of the detector tube, the plug is removed from the pick-up wires. One wire is then connected to the filament circuit as before, and the other is fastened to the grid terminal of the detector tube socket. Small spring clips soldered to the wires will make this easily done. In this way the volume of sound is increased to a degree depending upon the amplifying power of the detector tube. For a 201A type, the gain will be theoretically about eight times. It may be necessary to reverse the pick-up leads in order to eliminate a squealing noise due to body capacity.

The photograph at the left will give a clear idea of how the hook-up is accomplished. The increased volume will adequately repay you for the trouble involved.

Making a Frequency Meter for the Broadcast Bands



Various elements of a home-made frequency meter are diagrammed in the drawing above.

FREQUENCY meters, or wave meters, as they are often called, are almost necessary for the amateur who is building or checking sets used in the broadcast bands. One that will prove very efficient is shown in the accompanying photographs and sketches and is a simple matter to build.

Thin cigar box wood was used in the construction of the case, which is 6½ inches long, 5 inches wide and 3 inches deep. At one end was fitted a common wire drawer pull for a handle. At the opposite end near the bottom are a pair of Fahnestock clips to take the pins of the pick-up coil. A 23-plate variable condenser was then mounted inside the case below the front face of the case and near the handle. A vernier dial was used with this condenser to allow close adjustment.

The inside of the case should be shielded as much as possible. For this purpose heavy tinfoil was used. The inside of the case was shellacked and one side of the tinfoil. Then when the surfaces were tacky the foil was pressed down onto the wood and allowed to dry thoroughly. Trim away all foil to avoid contact with the condenser or other apparatus. Then ground the rotor to the foil with a small washer and screw. The rest of the circuit consists of a fixed crystal detector of good quality, a small coupling coil, a .00025 fixed condenser and a single circuit jack. The latter was inserted in the bottom of the case as indicated and the coupling coil was arranged inside close to the pick-up coil clips as shown by the dotted lines.

Using the frequency meter with a receiver to determine the wavelength of an unknown broadcasting station.

Here the back of the wave meter is removed, showing shielding and pick-up coil in clips.

In the circuit the rotor and stator of the .0005 condenser are connected to the pick-up coil clips. The coupling coil is connected to one side of the jack and to the .0005 stator and one side of the crystal. The other side of the crystal is then connected to the remaining jack post and the fixed condenser shunted across the jack. Use large wire and solder all connections. When the assembly is complete arrange the dial so it reads zero with the plates of the condenser entirely out. Then fasten on the back of the case to keep out the dust.

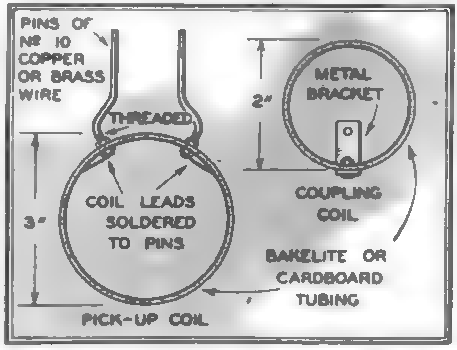
The coupling coil should consist of about 30 or 35 turns of any small insulated wire on a two-inch piece of bakelite or stiff cardboard tubing. The pick-up coil can be 50 turns of No. 22 D.C.C. wire wound on a piece of 3-inch tubing. Space the turns if possible, but get the spacing even and the thickness of the wire apart. The 50 turns are only approximate as the capacity of the condenser may vary slightly from the prescribed .0005 for a 23-plate affair.

The pins are made from two short pieces of brass or copper wire about 10 gauge and threaded on one end. They are then inserted in two parallel holes in the edge of the tubing and secured by two nuts, one above and one below.

Make a suitable mark on the case by which the condenser readings can be calibrated. A cardboard can be pasted to the back of the case if desired on which the readings that are taken can be jotted down.

Take your log book and find a station of known frequency at one end of the band. Hold the meter with the pick-up coil several inches away from the antenna coil of the receiver and parallel to it. Then set the volume control so the signal is fairly soft. Put on the headset and insert the plug in the meter jack. Hold the meter steady and rotate the dial slowly. When the wave of the broadcasting station is crossed you will know it by the signal in your headset. Find the point of maximum signal and make a note of the dial reading on the meter. Continue this process with high, low and intermediate stations until you have one notation for about every ten kilocycles.

The frequency of an unknown station can then be found by inserting a coil in the antenna and coupling the pick-up coil near

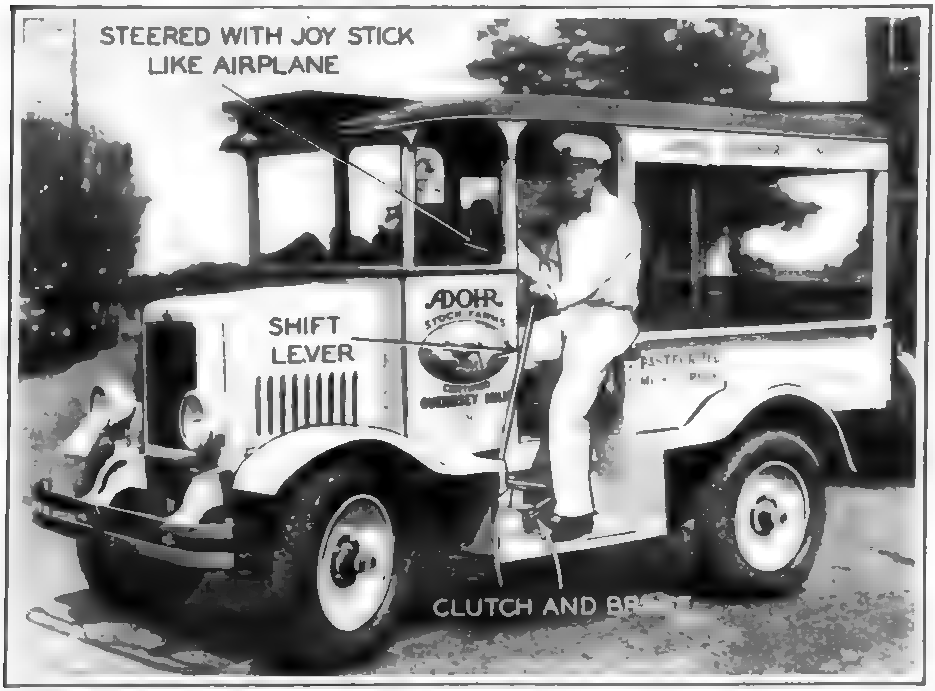


Details of construction of pick-up and coupling coil are given in the above drawing.

it. When the meter condenser crosses the wave the receiver signal will fade and the signal will be heard loudest in the meter headset. Always remember in any case to make the coupling between the pick-up coil and the receiver as loose as possible for fine tuning. Too close will make a wide dead spot and too far away will reduce the signal strength in the meter headset.

For small regenerative receivers of one and two tubes the click method can be used for finding the frequency of the signal. This consists of putting the headset in the receiver and shortening the meter jack. Then turn the condenser of the meter, with the receiver signal oscillating. When the wave is touched a click will occur in the headphones. When it is passed a second click will be heard. Midway between them will be the wave peak. Fairly loose coupling should make these clicks occur only three or four points apart on the meter dial.

Guide Silent Milk Trucks with "Joy Sticks" Like Plane's



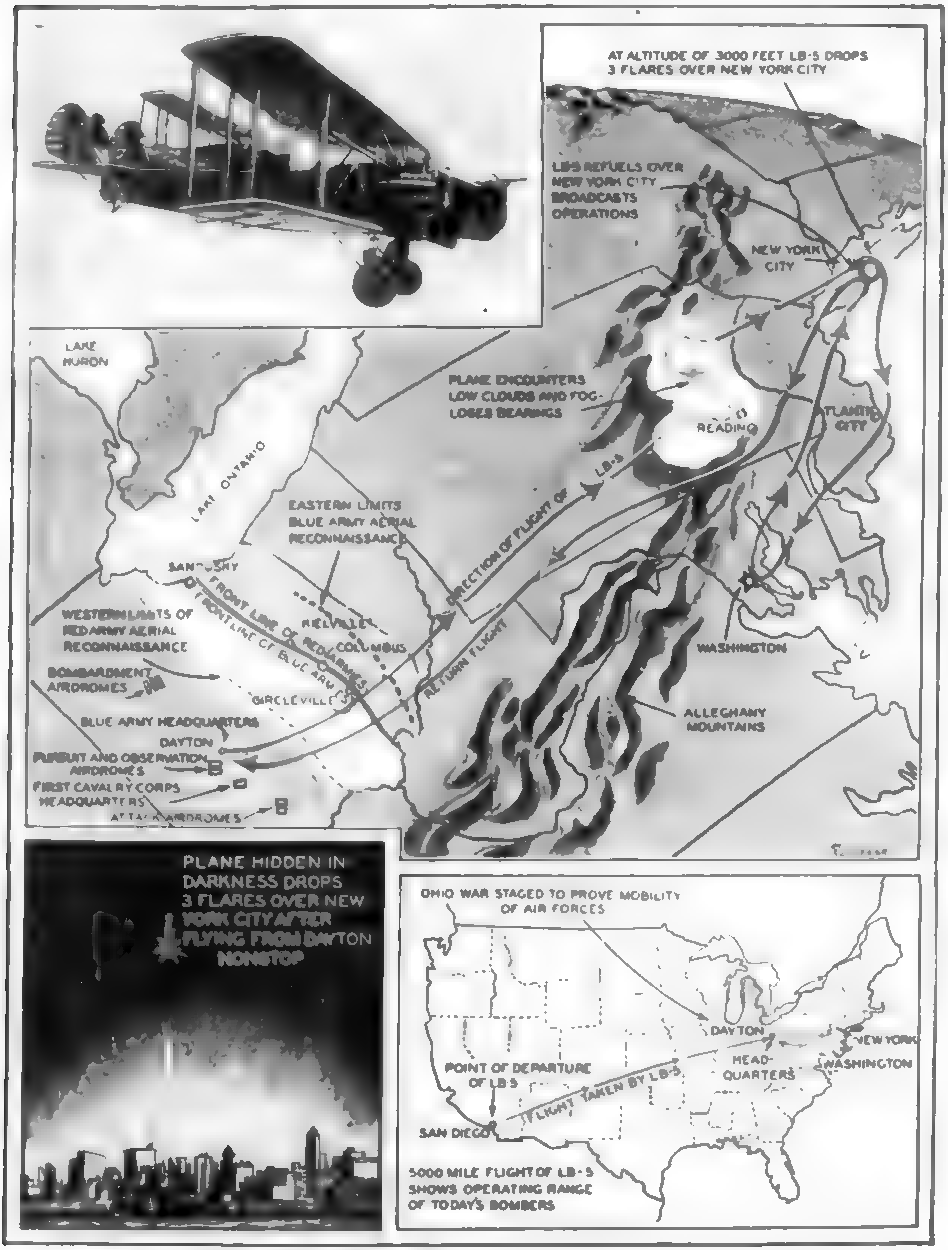
NOISELESS milk trucks, steered with "joy sticks" like those used in the controls of an airplane, have been introduced in Los Angeles, California. They were recently put in operation, and persons living in the residential districts of the city are no longer roused from their slumber at an early hour by the creaking and banging on the pavement of the old type milk wagons. The new trucks have no steering wheels. They are controlled by either of two "sticks" placed on each side of the truck in the driver's seat. These allow the milkman to operate the truck from the running board so that he does not have to be squeezing in and out from behind the wheel while making his route. This objection to using regular trucks is therefore eliminated. Brake and clutch pedals are also on each side of the car on the running board, and shift levers are so mounted that they, too, can be operated from the side.

Siren Gives Pilot Warning When Airplane Approaches Stalling Speed

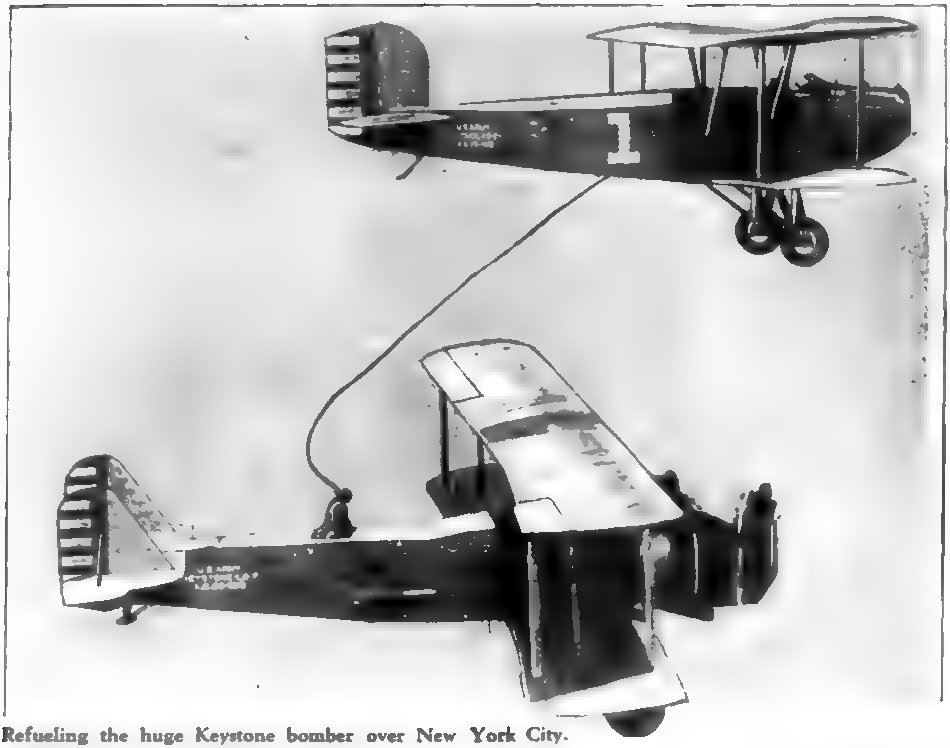
SCREAMING a warning when the air speed of a plane drops below a certain specified figure estimated close to the stalling speed, an automatic siren that has been recently developed can easily be heard above all sounds by the pilot at a height 1,500 feet in the air.

There is nothing to watch and nothing to be on the look-out for. In fact, the pilot may be dreaming of what he is going to do on his vacation. But as sure as he approaches the stalling speed, the siren shrieks and the pilot wakes up. The apparatus has only two moving parts and is extremely simple. In appearance it somewhat resembles a common bicycle siren. It consists of two concentrically-mounted cups with the usual slots cut in the circumferences. Both are free to revolve about a common axis. The outer cup is fitted with vanes which move it, when driven through air, in a clockwise direction. The inner cup is whirled by a two-bladed air screw in an anticlock-wise direction. The inner cup is mounted against a spring, which is released when the stalling speed is reached. Consequently the inner cup begins to revolve and the siren lets its presence be known.

New York at Mercy of Bomber Sweeping Down Thru Fog



Coming as a climax to 10 days of mimic warfare staged in Ohio by the U. S. Army, in which the entire air force took part in sham battles, the giant bombing plane LB-5, pictured in upper left hand corner, made a thrilling night flight from Dayton, Ohio, to New York City, where flares representing bombs were dropped to show that the city was at their mercy. The bomber itself was concealed by fog and clouds from watchers on the ground. The route of the bomber, which included one stop at Washington, is shown by the heavy red arrows on the large map above. Positions of the Red and Blue armies which fought sham battles for the capture of Ohio are also shown on the map.



Refueling the huge Keystone bomber over New York City.

Bombing of New York

NEW YORK CITY was theoretically obliterated one night recently when the LB-5, a huge Keystone Army bomber, made a non-stop flight from Dayton, Ohio, to drop three flares representing 1100-pound bombs on the downtown section of the city. This feat came as a climax to the Army's "War in Ohio," in which air and ground forces struggled in sham combat for possession of the Sandusky-Columbus battlefront.

To demonstrate the practicability of refueling large planes on bombing missions, the LB-5, which had arrived at Dayton after a flight from San Diego, left the Dayton field for New York at 1:15 P. M., May 22. A crew of five men was carried. Extremely bad weather conditions prevailed; the ship passed through low hanging clouds, rain squalls, and fog. At Reading, Pa., the ship encountered clouds which made the area dark as night, and it ran off its course until the navigator turned it back to its right path.

At 9:25 the plane emerged from the fog over the Statue of Liberty in New York harbor. Below the plane lay the lighted city, the harbor and Governor's Island, but the fog concealed the plane from watchers on the ground. New York was at their mercy. Owing to weather conditions refueling was impossible. To prove that the bombing mission was a success, three flares were dropped which lighted up the harbor bright as day. Then the plane disappeared into the fog, landing at 11:15 at Washington.

The following day the LB-5 returned to New York with its refueling plane and took on gasoline five times while flying above the Woolworth building at a height of 3000 feet. Then the plane returned to its base at Dayton. The flight had proved that bombers can reach their objectives under the worst possible conditions.

Announcing WINNERS in

Name these Famous Flyers

Identification on opposite page

Despite the fact that America is undeniably air-minded, contestants in Modern Mechanics' great "Win Your Wings" contest experienced considerable difficulty in correctly identifying the six famous flyers whose photos appear at the left. Can you name them correctly? Try your luck; then check your answers with the correct names on page 123. Forty-three lucky prize-winners are announced here.

ACCORDING to the unanimous judgment of contestants as expressed in their letters sent in to the editors, MODERN MECHANICS' great "Win Your Wings" contest went over with a bang. Rules of the contest, as readers of the June issue of this magazine will recall, called for the identification of the six famous flyers whose photographs appear in the column at the left, and required also that a letter of not more than 200 words be sent with the entry telling what the writer liked to read best in a magazine of modern mechanics.

A total of 3,565 entries was received from all corners of the country, and the judges were hard put to it in selecting the winners from the avalanche of meritorious contributions. The judges were "Speed" Holman, winner of several transcontinental air derbies and holder of the American loop the loop record with a total of more than 1,100 somersaults; Major H. H. Arnold, aviation editor of MODERN MECHANICS; and Captain Roscoe Fawcett, World War flyer and managing editor of the magazine.

A large number of contestants had to be counted out of the running because of incorrect identification of one or more of the flyers. Test your own acquaintance with aviation's heroes and heroines by naming the flyers for yourself. You can test your answers by checking them with the correct list of names printed at the bottom of the opposite page. One of the flyers who caused considerable trouble among the contestants was Eddie Rickenbacker, who didn't seem to be as familiar to readers as some of the other flyers. As for the flyer who bore the number "1" in the list, he was identified with 100 per cent correctness, as might have been expected.

After glancing at the pictures of the first three prize winners, which appear on the opposite page, the judges are confident that you will agree with them that they have chosen as likely-looking a trio of future aviators as could be found anywhere in the country.

Fred Resico, of Mt. Clemens, Mich., won first prize of a free ten-hour flying course. By the time this magazine is in your hands, Fred will be undergoing his course of training at Gene Shank's Fying School at Minneapolis, Minn. His progress in learning to fly an airplane will be reported in the pages of this magazine. Fred is 19 years old, weighs 148 pounds, and is 5 feet 11 inches in height.

Truman K. Cole, 318 So. 5th Street, Springfield, Ill., won second prize—a leather flying coat, made to his order. Robert Dumas, 3023 Roscoe Street, Dallas, Texas, won a leather air-mail helmet and a pair of non-shatterable goggles as third prize.

"Win Your Wings" Contest

Second Prize Winner
TRUMAN K. COLE
318 South 5th St., Springfield, Ill.

First Prize Winner
FRED RESICO
Mt. Clemens, Michigan

Third Prize Winner
ROBERT DUMAS
3023 Roscoe St., Dallas, Texas

Forty-three Prize Winners Place "In the Money"

Forty free airplane rides, awarded to runners-up in the contest, went to the following: Loretta Flannery, 1167 40th St., Brooklyn, N. Y.; Howard A. Wagle, 4138 Balboa St., San Francisco, Cal.; Ruth Huttner, 54 Morton Ave., Albany, N. Y.; Hubert J. Owen, Box 298, Johnson City, Tenn.; Harold Reeves, Route No. 1, Box 21, Echo, Oregon; Herbert Brown, 106 East Clinton St., Clinton, Mo.; Robert G. Borgens, 1821 S. 9th St., Lincoln, Neb.; Bud Allen, 910 So. 10th Ave., Maywood, Ill.; Leon V. Davis, 706 W. Merrick St., Henryette, Okla.; Clark E. Winchester, 329 West 5th St., Auburn, Ind.; Paul Grimmitt, 106 Webster Ave., Rockford, Ill.; Herbert Haffter, Mount Olive, Ill.; Edward Porter, 824 East Adams St., Clinton, Ill.; Walter E. Boswell, 362 River Bluff Road, Elgin, Ill.; Carl Unrath, 931 East Market St., Iowa City, Ia.; Marvin Clemens, 3478 Silsby Road, Cleveland Heights, Ohio; R. E. Ringle, 6020 Drexel Ave., Chicago, Ill.; Claude Ford, 435 Lincoln St., Rhinelander, Wis.; Vincent Hamilton, 913 North 49th Ave., Omaha, Neb.; Sam Bakshas, Jr., Lewistown, Mont; Irving Prout, 173 Ocean St. So., Portland, Maine; Harry C. A. Mackel, Jr., 3153 C. St., Philadelphia, Pa.; Fred J. Booth, 1770 School St., Stockton, Cal.; William Dunn, 209 West Alameda, Tucson, Ariz.; Douglas Rollins, 1413 11th Ave. So., Fargo, N. D.; Alvin E. Granelle, 908 West Highland Drive, Seattle, Wash.; Harlowe G. Hunt, 114 Horne St., Raleigh, N. C.; Dawner Renshaw, 844 Ocean Drive, Miami Beach, Fla.; George Reid, Jr., 405 East 37th St., Savannah, Ga.; Raymond Coyer, 418 Anthony St., Fall River, Mass.; Yoshio Kondo, P. O. Box 394, Hana Maui, Territory Hawaii; Arthur Joseph Cantin, Jr., 10013 115th St., Edmonton, Alberta, Canada; James Theisen, 1014 Garfield Ave., Dubuque, Iowa; Myer Harris, 96 Major St., Toronto, Ont., Canada; F. W. Easter, 727 14th St., Denver, Col.; John B. Brown, 446 Bay St., Ottawa, Ont., Canada; George Mazon, 37 South 2nd St., Phoenix, Arizona; Frank Fulford, 872 Valour Road, Winnipeg, Man., Canada; Walter Stokes, Care of Circle Motor Inn, Indianapolis, Indiana; Nicholas Poppas, 1190 Victoria Drive, Vancouver, B. C., Canada.

Correct Names of the Six Famous Flyers

1. COLONEL CHARLES A. LINDBERGH
2. RUTH ELDER
3. COMMANDER BYRD
4. AMELIA EARHART
5. ORVILLE WRIGHT
6. EDDIE RICKENBACKER

Miniature of Mississippi Side Wheeler Affords Real Sport

DESIGNED after the old Mississippi river sidewheel steamer, this queer-looking boat at left was recently introduced as a new form of water sport. It is propelled by paddle wheels on each side that are turned by separate hand cranks in the interior of the craft. These provide a means of steering, as one wheel can be turned forward and the other held motionless or reversed to turn the bow of the boat. The handles are extremely easy to revolve and a child can operate the craft.

Re-Enacting a Race of the 80's

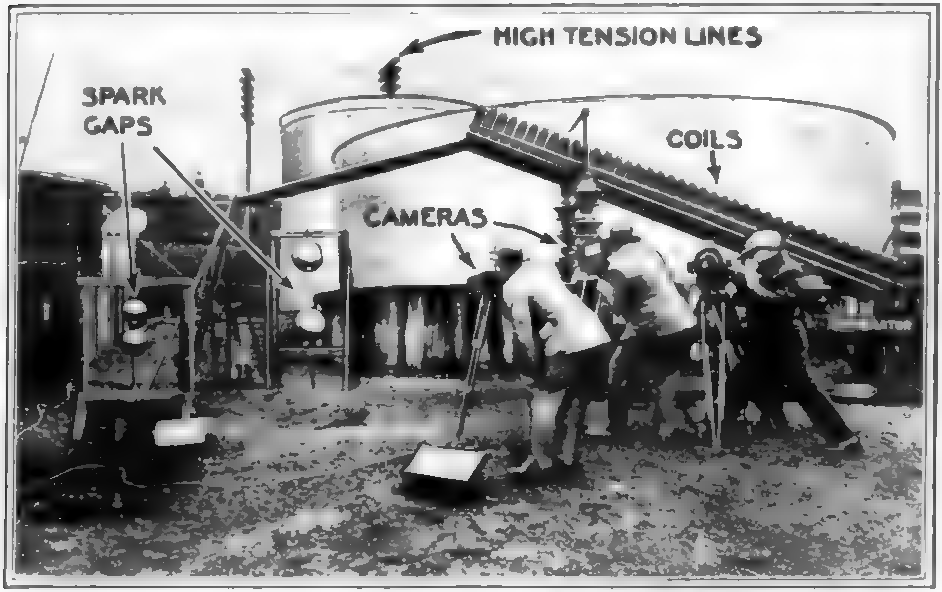
SAN FRANCISCO society girls recently staged an old fashioned bicycle race in front of the city hall. They are shown below as they lined up at the start. In order to make the contest realistic, they delved into dust-covered attics and produced clothes that were the last word in style in the late 80's. Six of the girls dressed like boys and the other six were attired like grandma used to look in her girlhood days.

New Sugars Will Aid Science

RECENT discoveries in the chemical study of sugars have opened the way to almost limitless possibilities of obtaining new varieties of known structure whose importance as medicinal ingredients, food products and factors in industry and science can scarcely be estimated, according to a statement by Dr. Claude Silbert Hudson before a gathering of scientists recently at the University of Chicago. Dr. Hudson is chief of the chemical laboratory of the hygienic division of the United States Public Health Service in Washington, D. C. He cited the fact that 20 new sugars have been invented and can now be made synthetically.

Flowing skirts, tight-fitting corsets and cumbersome bustles handicapped the girls in this bicycle race.

Direct Artificial Lightning Toward High Tension Wires



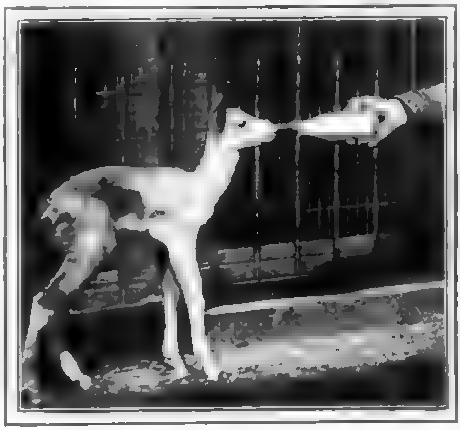
PRODUCING ominous flashes of lightning, this apparatus shown above is part of the equipment in the high voltage laboratory of the General Electric company, Schenectady, N. Y. Electrical engineers and technicians are thus enabled to experiment with the bolts and apply the results of their findings to the insulation of high tension wires. Movies were taken of the powerful sparks that were created and the films studied carefully in the "dark room" of the laboratory. In the experiment that is being performed in the photo above, lightning bolts were shot at the high voltage wires to test their insulation. Defects that were observed were remedied and the actions of the bolts studied further. The experiment was continued until the insulation was pronounced perfect.

Seriously Burned By Friction

WITHOUT the presence of fire or flames, an Oregon youth was severely burned recently when he slid 2,500 feet down the side of Mount Hood glacier, a vast hulk of ice and snow. Friction engendered in the fall caused the burns, physicians said, and although he suffered no broken bones, his body was crisped as though he had been through a gauntlet of hungry flames. With 40 others, he was climbing the mountain.

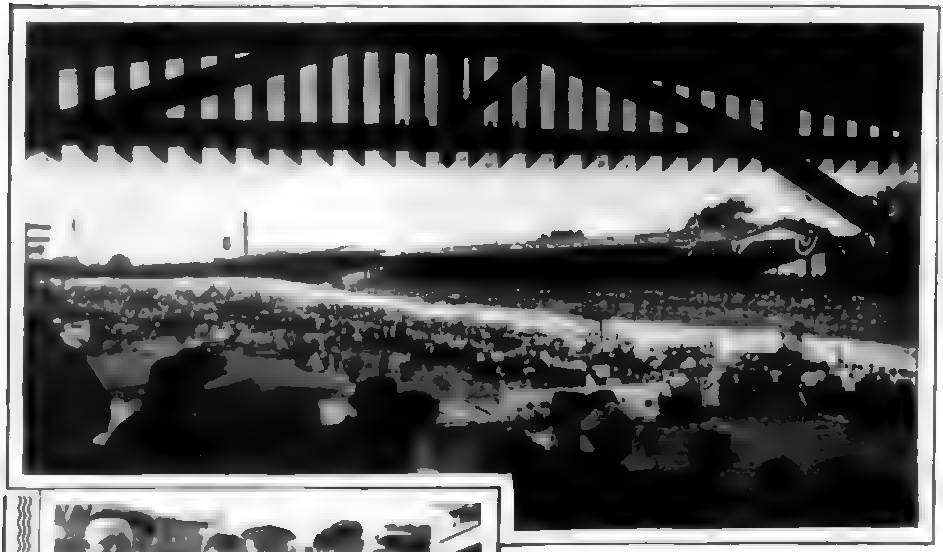
Special Nipple for Zoo Orphan

DEATH of the mother of this baby antelope shown below required keepers in a Washington zoo to become nursemaids for several weeks. A special nipple was made to fit over a baby's milk bottle, and the newcomer in the zoo was fed regularly by this means. The nipple was so designed that the sharp teeth of the tiny antelope would not pierce the rubber. It was made especially for this purpose in a nearby tire factory.



Fiber rubber composes the nipple of milk bottle.

ONE-MAN CARS "SING



A view of a portion of the 2½ mile track at Indianapolis from the interior of the stand.

The famous Indianapolis Speedway 500-mile race has been run for the last time by cars large enough for only a single driver. Next year will see a new type, two-man racer.

Ray Keech, shown above, won the grueling 500-mile race this year at the Indianapolis Speedway. He drove a beautiful race, averaging 97.6 m.p.h.

THE receding drone of the tenth car's motor as it flashed across the finish line at the recent Indianapolis Speedway 500-mile race, marked the passing of a distinct feature of modern automobile racing.

The miniature one-man cars that have made this one of the most colorful of all sports competed in a 500-mile race for the last time. They will be replaced in this event in 1930 by racers carrying a mechanic as well as a driver.

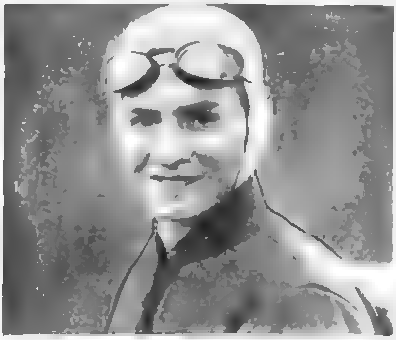
In order that the original purpose of the classic—to test new devices and adoptions on racing cars so that the successful results might be later applied to pleasure cars—be fulfilled, officials of the Contest Board of the A. A. A., which controls the race, decided to alter the regulations.

The tiny appearance of the present racers is due to the fact that the motors have a piston displacement of only 91 cubic inches. In 1930, cars with almost four times that much displacement will race for honors. The board's regulation specifies "not more than 306 cubic inches."

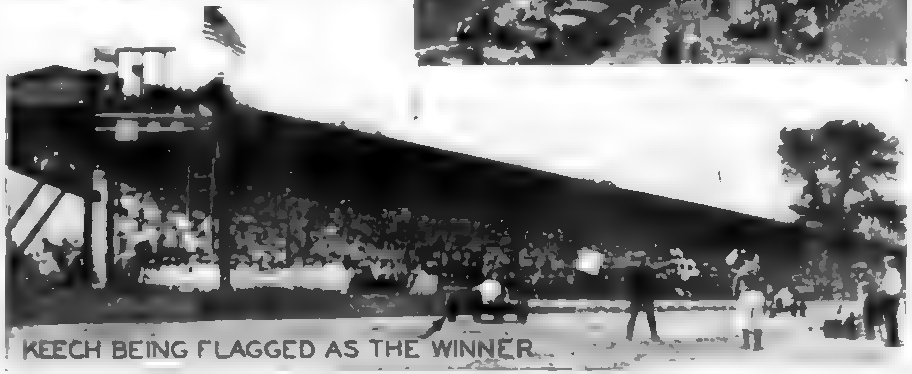
When automobile racing was first innovated, cars were designed to accommodate both a driver and a mechanic. Now that one-man cars have been developed to a high point of perfection, the two-man design is coming back into favor.

SWAN SONG" in CLASSIC

START OF 500-MILE RACE



One of the "breaks" of the race occurred this year when Lou Moore, shown at right, drove splendidly all through the race only to have his car burn up on the last lap as he was making a spurt to catch Ray Keech. At the time, he was in second place and was only 41 seconds behind the flying leader. Had his car kept up just a few minutes longer, one of the most thrilling finishes in history would probably have been enacted. Louis Meyer, below, went into second place when Moore was out.



KEECH BEING FLAGGED AS THE WINNER

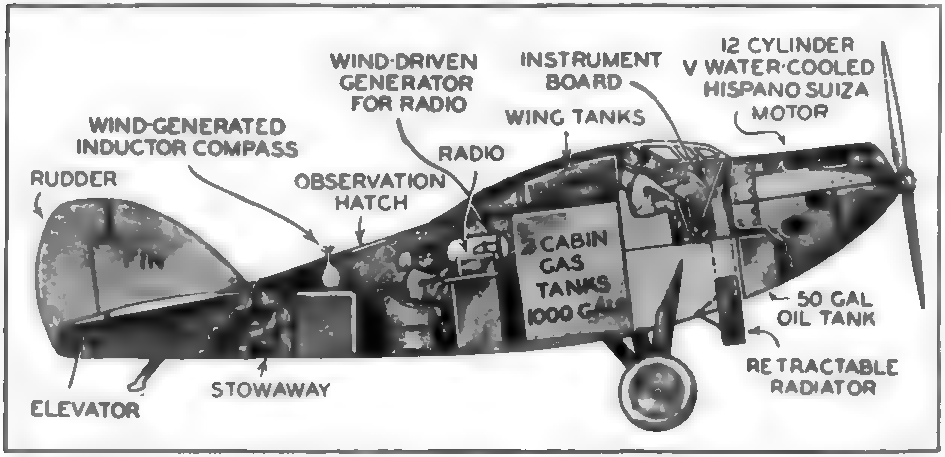
The Non-Stop Flight of the

Crew of the Yellow Bird, left to right—Rene Lefevre, navigator; Jean Assolant, pilot; and Armeno Lotti, Jr., co-pilot.

Once more the Atlantic is conquered in a non-stop air flight, this time by a gallant crew of Frenchmen who fought through bad weather to a successful landing, hampered by the weight of the first trans-Atlantic airplane stowaway who nearly brought disaster to the flight.

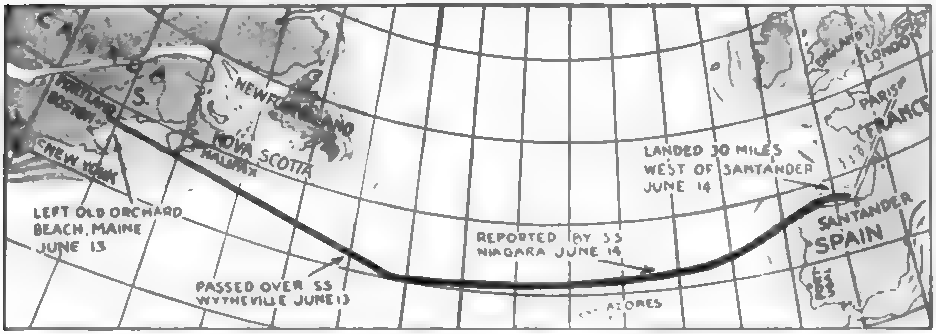
CARRYING on through rain and fog and wind, supporting the extra weight of a stowaway whose unexpected presence added greatly to the perils of the flight, the French monoplane Yellow Bird did its bit for aviation history when it landed on the Spanish coast June 14th, having crossed the Atlantic from Old Orchard, Maine. It was the eighth successful eastward crossing of a heavier-than-air machine.

The three airmen were Jean Assolant, pilot; Rene Lefevre, navigator; and Armeno Lotti, Jr., financial backer. The stowaway was Arthur Schreiber of New York. Praise for the feat of the pilots in bringing the flight to a successful conclusion was no less sincere than public criticism of the conduct of the stowaway Schreiber, who in a mistaken excess of youthful spirits concealed himself behind a storage bulkhead in the Yellow Bird, as shown in the cutaway drawing below, and thus by his added weight not only risked crashing the plane on the take-off, but deprived his hosts of the satisfaction of carrying their flight to the conclusion they had planned. The Yellow Bird



This cutaway drawing of the Yellow Bird shows how the interior of the plane was arranged. Note the two heavy gasoline tanks at the center of gravity. Hiding-place of the stowaway is also shown.

French "Yellow Bird"



This map shows how the Yellow Bird turned to the southward of its original course to avoid a storm, thus landing in Spain instead of France when their fuel gave out. Distance flown, 3128 miles.

was scheduled to land at LeBourget Field, Paris, but Schreiber's weight so increased the gasoline consumption that a forced landing was made near Santander, Spain, when the fuel gave out.

Flyers have pointed out that Schreiber's 170 pounds near the tail skid of the plane made a crash imminent on the take-off, since he destroyed the carefully planned balance of weight. A trans-Atlantic plane, heavily loaded with gasoline, is sluggish in taking the air, and only good luck and skilful piloting saved the tail-heavy Yellow Bird from the fate of the Green Flash, a rival trans-Atlantic plane which crashed on the take-off. With true French sportsmanship, the flyers passed off the incident of the stowaway good-naturedly, but American flyers have expressed themselves as wondering why the Frenchmen didn't drop the unwelcome and unwanted passenger out of a cabin window to walk back home where he belonged—a reward surely justified by his foolhardy conduct.

The plane used by the Frenchmen was a Bernard monoplane, powered with a water-cooled V-type Hispano - Suiza motor. Most crossings have been made with motors of the radial air-cooled type. The plane took off from Old Orchard at 10:08 a. m. June 13th and landed near Santander, Spain, at 4 p. m. June 14, after flying 29 hours and 52 minutes. The distance covered was 3128 miles, giving the plane an average flying speed of 105 m.p.h.

In all, 2300 gallons of gasoline were carried, all of which was consumed. Two wing tanks held 150 gallons each, and behind the pilot's cabin were two other tanks each holding 1000 gallons.

A storm which the ship encountered south of Newfoundland forced it off its path.

Here is the Yellow Bird just before taking off on its over-ocean flight, being towed to the starting line on the beach at Old Orchard, Maine. The human figures give an adequate idea of its huge size.

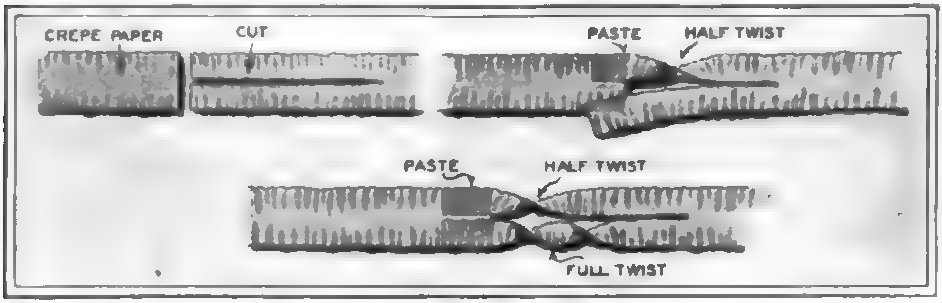
By SAM BROWN

Have you ever yearned to be a magician and pull rabbits out of hats, 'n everything? Mr. Brown here gives the "lowdown" on several baffling tricks which can be performed without elaborate equipment.

INTRODUCING — magic for everybody. That means you, it means the chap who reads this magazine over your shoulder, it means intelligent people (anyone reading this far is) and the other kind, it means—well—*everybody*.

Here we go: The performer exhibits a long band of crepe paper. He cuts this lengthwise through the middle, completely around. The result is two separate bands. Nothing so very magical about that . . . but wait! Cutting one of the two remaining bands in a similar manner, the performer produces two bands *linked together;* and cutting the second band he produces an even more remarkable effect—one large band, fully three times the size of the original loop!

"The nigger in the woodpile" has to do with a little previous preparation. Take a



The simple bit of preparation illustrated above is all that is necessary in performing the trick of the magical bands, which, when cut in two, are found to be mysteriously linked together.

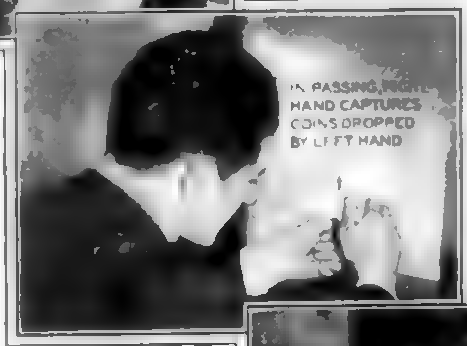
The illusion of passing a match through a box into the palm of the hand is mystifying, but easily done. The match box is empty, but a match has been concealed between the drawer of the box and the cover so that it can easily be produced by a movement of the finger—unseen, of course, by the spectators.

strip of crepe paper, four inches wide and five feet long, and cut a long slit in one end, as shown in the diagram. Now, take the upper portion of this cut, and, after giving it a half twist, paste it to the other end of the band, as shown. Give the remaining portion a full twist and paste it down in a similar manner. There! The trick is finished. Cutting down the center will, of course, give you two separate bands. Dividing the full-twist band, however, will result in two bands, looped; while a cutting of the half-twist band will give you the surprising result of one large band. Crepe paper lends itself admirably to the effect because it can be casually stretched for the last effect, making the band fully three times the size of the original loop. In performing the effect, the cut portion of the band should be kept well to the rear until you start the first cut. After that—high-o-the-merry-o!

Matchboxes are such handy articles. Here's a simple little bit of magic with the midget fire box. It's really good. The performer shows both hands to be empty. He then freely exhibits a matchbox and places it on the palm of his right hand. Presto! And in some mysterious manner, a match has passed right through the box and is found in the performer's hand!

Here's the how: Take an ordinary box of matches and slip a match between the bottom of the drawer and the cover. When you remove the drawer to exhibit the contents of the matchbox, you remove this concealed match and retain it against the bottom of the drawer with your forefinger. In replacing the drawer, you let the match go to the underside of the cover, that is, outside the box proper, as shown in the explanatory photograph. Well, that's all they is, Amos! You mutter the magical words, and there you are!

Here's something simpler: A lot of people have lost money on things like this: The performer exhibits three penny boxes of matches. He shakes the boxes. Two of



This one is known as the Hang Ping Chien coin trick, in which a handful of coins is apparently thrown through a table. The photos illustrate the method of transferring the coins from left to right hand so that the spectators will not suspect what is occurring.

them give forth no sound. "Empty!" The third rattles as if it were full of matches. "Full or partly so."

Now for the big swindle. Requesting the spectator to keep his eyes on the full box, the performer slowly moves the trio of boxes around on the table. "Keep your eyes on the full box. Now, where is it? That one? Sorry, but that box is empty! See, here's the full box! Was that a nickel or a dime that time?"

The solution is absurdly simple. All of the boxes are empty. The performer has a partly-full box concealed in his left sleeve. Now, do you see the light? By shaking an empty box with the right hand, the box will forever sound empty—but—take up the same box with your left hand . . . Shake it! And the box in your sleeve rattles raucously, the illusion is complete, and you win the shekels! Whether or not you substitute a full box for one of the empty ones at the conclusion of the trick is a matter of personal taste and sleight-of-hand ability.

Many moons ago, a Chinese magician by the name of Hang Ping Chien did subtle magic with a few coins. He invented a masterpiece of magic. He called it "The Hang Ping Chien Coin Trick." And—believe it or not—it's good. Listen: The magician is seated at a table. He exhibits a number of coins, two nickels, four pennies and one quarter. He takes up one nickel and two pennies in his left hand, and one nickel, two pennies and the quarter in his right hand. He places his right hand underneath the table. The left hand, closed in order to retain the coins, is then opened and brought down flat on the table, imprisoning the coins below it. The magician then remarks that he has the same number of coins in his right hand, plus the quarter. The right hand is brought out from underneath the table. Watch! Yes, there they are—two pennies, a nickel, and the quarter. The right hand picks up its coins and goes below the table again . . .

Now for the trick. The left hand, still apparently holding its coins, is brought down with a resounding smash on the table. An instant later, the tinkle of falling coins is heard, and the performer smilingly brings the entire lot of coins out from below the table in his right hand, the coins from the left hand having been apparently driven right through the table top! How's that?

Do it like this: You show each hand with its quota of coins—two pennies and a nickel in the left; two pennies, a nickel and a quarter in the right. You put your right hand below the table. You smash down your left hand, imprisoning that hand's

quota of coins on the table. Now, you bring your right hand from below the table, closed in a fist. The audience thinks it contains its full number of coins. Really, however, it contains only the quarter, the balance of the coins having been left upon your right knee.

Here's the important move: The left elbow is resting on the table, the forearm slanting towards the right, as shown in the photograph. Your eyes are on your right hand. The right hand is swung slightly above the left and then brought straight down towards the table. As it reaches the left hand, the right fist opens. At the same instant, the fingers of the left hand are loosened to allow the coins of that hand to fall out, as shown in the photograph. These coins are immediately caught under the swift, downward swoop of the right hand and swept with the quarter down to the table. The left hand tightens up again and moves slightly to the left.

Given: A ring through which is threaded a looped string, the ends of which are held by the thumbs of the spectator. Problem: remove the ring without removing the thumb from one of the loops. Form a new loop, slip it over the thumb as shown, remove the old loop and take off the ring.

And there you have it. A perfectly natural, beautifully timed, indetectable move, and the right hand is apparently showing its quota of coins, although they are really the coins belonging to the left hand, plus the quarter. Of course, you know the rest. The right hand picks up the coins, goes below the table, recovers the other coins, and then lets them tinkle lightly the instant after the empty left hand has been brought down on the table. Try it! It's a magical tid-bit par excellence, and much easier than it "sounds at first sight" . . . as the Irishman would say.

This next little bit finds the spectator holding a loop of strings over her thumbs. The string has a ring threaded on it. The performer is going to remove that ring. The performer must not remove the string from the thumbs of the fair spectator.

Well, let's see: Grasp the ring with your left hand. Take the string at the point marked A, and pull it up to the position shown in the photograph. Slip this newly formed loop over the right thumb of the spectator and then remove the loop that is already there. That's all! It's really a treat to witness the complicated snarl of string untangle as the ring gleefully slides to freedom.

Here's something else—an illusion this time! The magician's assistant—a young girl, wearing in addition to her regular dress, a pair of white work gloves—is led behind a curtain which has been hung over a doorway. The curtain has three holes in it—a large hole and two smaller ones. On the command of the performer, the assistant

Magician Changes Girl Into Blackface Comedian with Flick of Wand

The performer in the first panel of the above illustration holds a concealing cone over the head of the person behind the screen, whose gloved hands project through it. Removing the cone, he uncovers the head of a young woman; replacing the cone and removing it again, the head of a blackface man appears, although the hands have not moved. Right photo shows how trick is done.

puts her head through the larger hole and her gloved hands through the smaller holes. The performer then places a large paper cone over the head of the assistant. When he removes the cone a second later, the girl is gone and a blackface comedian is found in her place. He comes out, sings a song, does a dance, or what have you; while the girl assistant trips in lightly from the opposite side of the room.

It's dead easy. The blackface "felleh" is already in place behind the curtain. When the performer commands, the girl pushes her head through the large hole. When the performer commands her hands to appear, however—this is the dirty work—it is the blackface comedian's hands, likewise clad in gloves which put in their appearance, as shown in the photograph. Immediately the paper cone is in place, the girl draws her head back through the hole and allows the comedian to put his in. The audience sees hands which they imagine belong to the girl. All clear as mud now? The girl opens a few doors here and there and walks in from the other end of the room, simultaneously with the appearance of Al Jolson.

Here's one of those mind reading tricks that always click. The performer asks a spectator to jot down a number of three figures. Say: 731. The figures are then to be reversed and the smaller one subtracted from the larger one:

731
137

594

This figure is then to be reversed and the two added together:

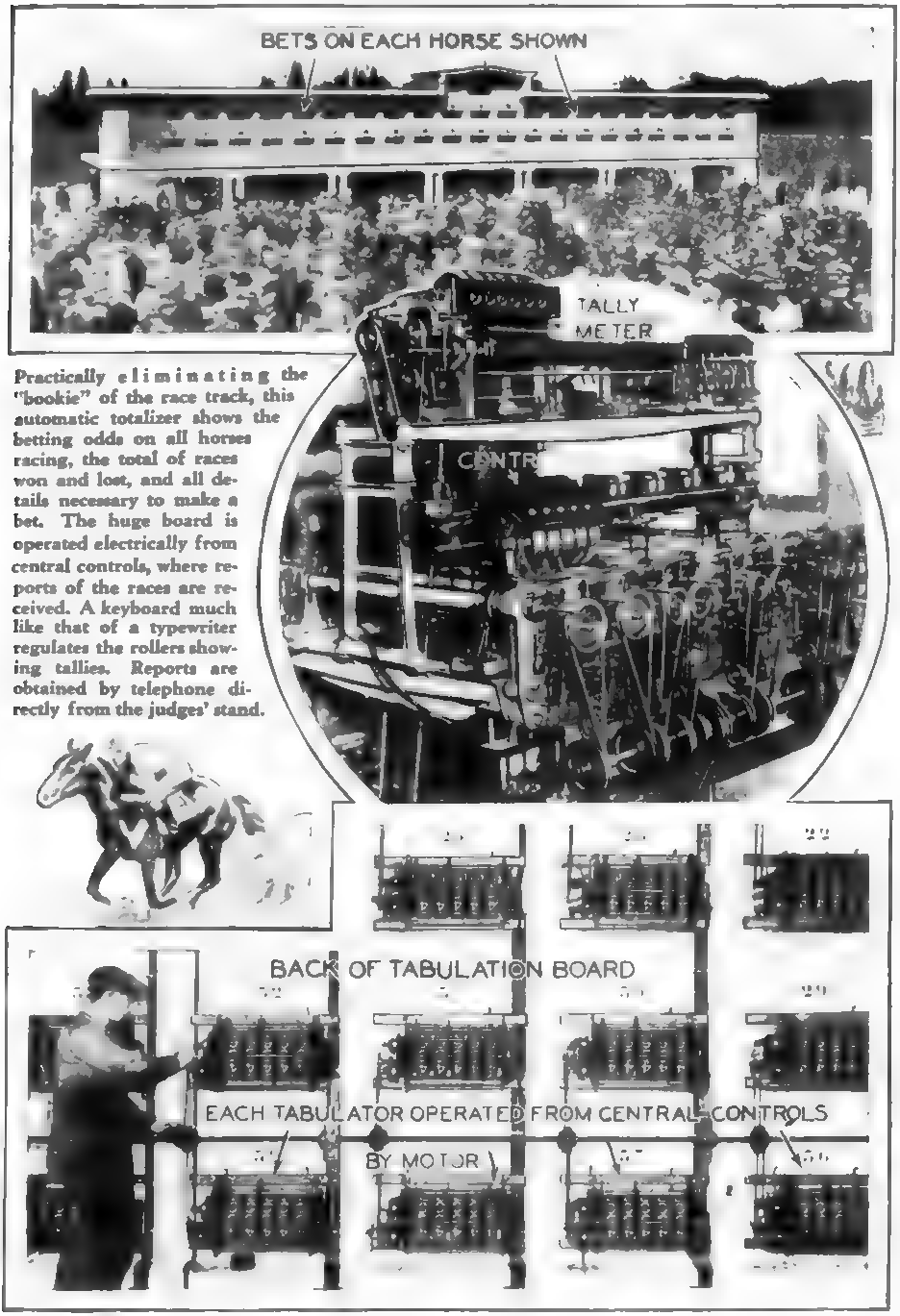
594
495

1089

After the arithmetic is over, the performer requests the spectator to select any of several books which are on the table. Done! "Now," asks the performer, "was your answer a figure of two, three, or four numbers? Four? Thank you!" The per-

(Continued on page 176)

Automatic Betting Board Ousts 'Bookie' From Race Track



Practically eliminating the "bookie" of the race track, this automatic totalizer shows the betting odds on all horses racing, the total of races won and lost, and all details necessary to make a bet. The huge board is operated electrically from central controls, where reports of the races are received. A keyboard much like that of a typewriter regulates the rollers showing tallies. Reports are obtained by telephone directly from the judges' stand.

Dog Mascot Interested Passenger in Army Air Maneuvers

AN ACTIVE participant in the recent maneuvers of the United States air forces over Ohio, Maggie, mascot of Captain E. E. Black, commander of the 11th pursuit squadron stationed at San Diego, California, is shown at right just before she took off for a flight with her master.

The dog was equipped with her own parachute and has often used it. She has been taught to open the chute when taking a jump by pulling the release cord with her teeth. By wearing the parachute on the trip, she conformed with army regulations that all passengers or pilots taking part in the maneuvers have such equipment.

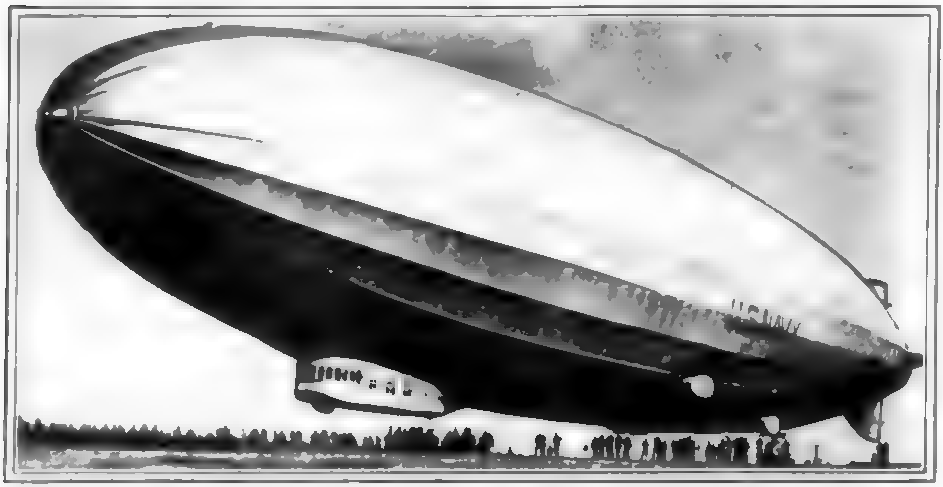
Taking Off Under New Command

WHEN Lieutenant-Commander C. E. Rosendahl, former officer in charge of the Navy dirigible *Los Angeles*, was recently promoted, Captain H. V. Wiley was named to succeed him in command of the huge ship. In the picture below the *Los Angeles* is taking off on her initial flight under the new commander. The dirigible is one of the largest in the world and measures 656 feet in length. It is 90 feet in diameter and has a gross lift of 80 tons. Its cruising speed is 67 m.p.h. and its maximum is 76 m.p.h.

New Chute Record Is Set by Girl

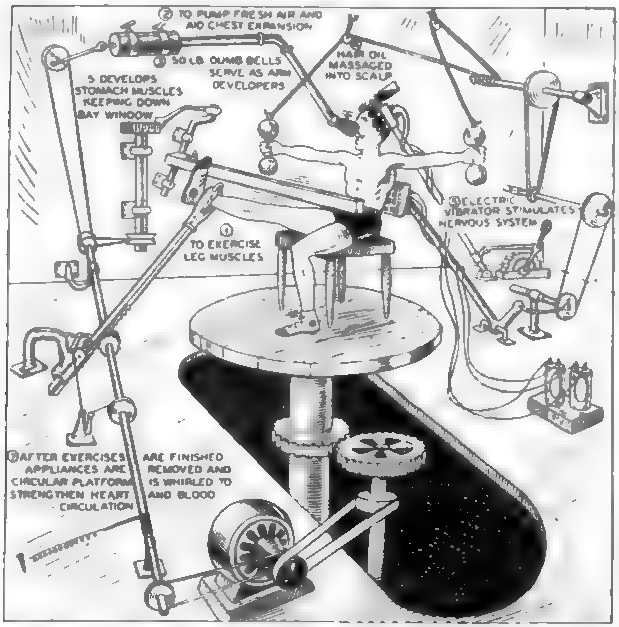
FALLING through snow and bitter cold from a height of more than 19,000 feet, Miss Jean du Rand, 19 year old Minneapolis parachute jumper, established a new women's world parachute record recently when she leaped from a plane piloted by Gene Shank, contributing editor of MODERN MECHANICS.

In an attempt to best the record of 19,000 feet set by a German woman, Miss du Rand and Shank ascended to 18,700 feet where the cold and thin atmosphere froze the altimeter. They then pushed up to what was estimated about 500 feet farther and the slight girl swung from the wing of the plane into a biting wind and dropped.



The Los Angeles, huge U. S. Navy dirigible, is powered by five 400 h. p. 12-cylinder engines.

Coo-Coo Editor---His Page



The tired business man should find great solace in the ultra modern gymnasium shown above. Cecil Allen, of Pleasanton, Texas, won $25 for the above contraption.

The popular Coo Coo Contraptions Contest is drawing to a close. The announcement of Contest No. 8 winners will be followed by one more contest. No. 9 will be the last. The urgent need of space has forced the Editors to discontinue this interesting feature. Get going!

TIRED but happy, the Coo Coo Editor finally decided the winners of Contest No. 8. It was a hard job because of the great number of high grade entries that have flooded MODERN MECHANICS office ever since the Coo Coo Contraption Contests were begun. As was announced in the August issue of MODERN MECHANICS, the Coo Coo Contraption Contests will come to a close with No. 9, winners of which will be announced in the October issue.

Another thing, don't forget that all entries for Contest No. 9 must be received before August 1, 1929. Any received after that date cannot be considered.

Prizes in Contest No. 9 will total $50, distributed as follows: First prize, $25; second prize, $10; and five third prizes of $3 each. In case of a tie for any of the prizes, the full amount of the award will be paid to each tying contestant. Manuscripts will not be returned. You do not have to be a subscriber of MODERN MECHANICS to enter this contest.

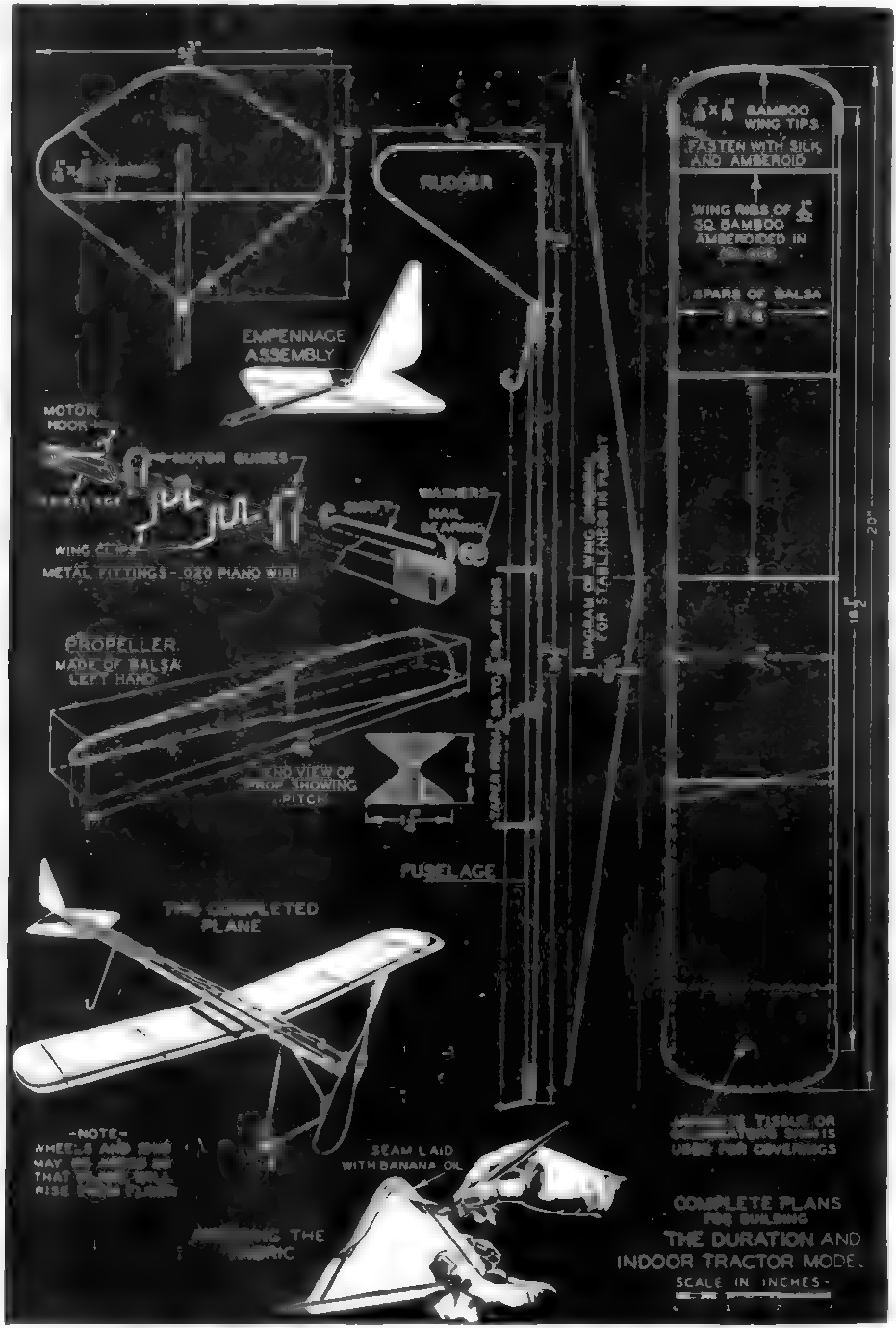
There is one task which gives the Coo Coo Editor great pleasure—that is awarding prizes. Contest No. 8 finds the following as winners: Cecil Allen, Pleasanton, Texas, walks off with the first prize of $25. The Editor chose this one as the best from the huge supply of entries because of the clever idea that it contained. In this age of mechanical wonders a home gymnasium such as Mr. Allen has concocted would be of untold benefit to any family that might not have access to the large gyms of our city athletic clubs. By using Mr. Allen's device they could get all the exercise they needed. Note also the extreme simplicity of this equipment.

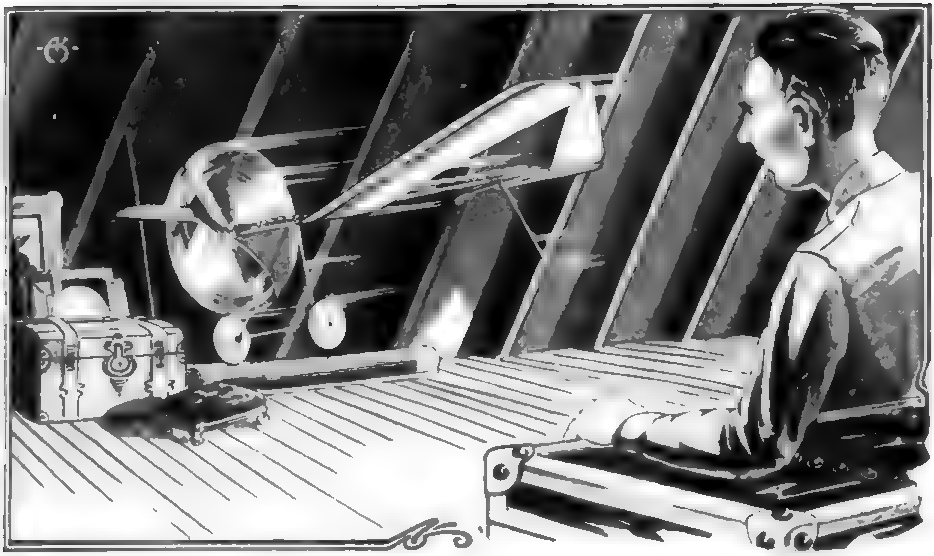
T. L. Moore, 625 Ledyard St., Detroit, Mich., has been chosen as the second prize winner. This brings Mr. Moore $10. A plan for aiding the business man in getting off to work in time was his contraption. It was well done and showed lots of originality.

The five third prize winners are: Chas. H. Hardy, 441 S. Sydney Drive, Los Angeles, Calif.; L. S. Sweet, Jr., 425 Jeffords St., Clearwater, Florida; William Fitzpatrick, 286 Prescott St., Yonkers, New York; and Lawrence B. Holdridge, 5112 Norwood Road, Baltimore, Maryland. These five boys win $3 each.

In light of the fact that Contest No. 9 is to be the last, let's see everybody concoct a contraption that will make the Editor sit up and take notice. How about it, gang?

Indoor Duration Model Can Be Built in Approximately Three Hours





Slow flying as this model is, it is ideal for indoor use and will not bruise easily.

INDOOR DURATION MODEL AIRPLANE

By JAMES BATES

BACK in the early days of model aeronautics practically all the contests were held indoors because as the models were not able to perform in any wind, and as their flights were of short duration a large building offered the best accommodations. It also provided arrangements for spectators.

Indoor model flying has been resumed, and the armories of the National Guards of most cities have monthly meetings sponsored by the manual training classes of the public schools. To meet the conditions of indoor flying requires a model that flies slowly and that is a "floater"; one that takes off with ease if supplied with the r.o.g. equipment, and which can set up some good flights of several minutes' duration in such a building as for instance a university field house.

The model shown in this article was the winning model of the meet, recently held in the northwest and is the development of Mr. Frank Steele, of the manual training department of the Minneapolis, Minn., public schools.

To build the design shown you will need the following materials. Fuselage: 1 piece of balsa wood, 15½x¼ inches, and a piece of bamboo 12 inches long from which to pare the fine wing tips, ribs and empennage outlines.

Wing: two pieces of balsa, 18½x⅛x 1/16, and bamboo for the wing tips. Propeller: 9¾x1x1¼-inch balsa wood. Fabric: 1 sheet Jap tissue 24x12 inches, silk thread. Rubber: 36 inches ⅛x1/32 inches. Glue: Ambroid and banana oil for the surfaces.

First make the fittings of metal. These consist of the nail bearing, the two hooks for the front end and for the propeller shaft, and the guide hooks to keep the rubber strand motor from flopping all over. The bearing is made from an ordinary brad

with the head mashed flat and drilled for the propeller shaft. The washers can be had from any model supply house. A No. 65 drill will put the right size hole through the bearing, and the hooks are made as per the drawing shows of .020 piano wire. The wing clips are from .15 piano wire, ambroided to the wings when bent as the drawing shows.

The fuselage stick is 15½ inches long, and tapers from ¼ inch at the middle to the size of 5/32 inches at the ends. Banana oil will stiffen it if it is painted with banana oil after planing to size. The propeller bearing the tail hook and the guides are lashed on with silk thread and ambroided. Care should be taken when doing this.

Bamboo for Tail

The tail surfaces are easy to make, and are nothing but a loop of bamboo 1/16 by 1/32 inches bent as shown. Hold the bamboo you peel with your knife from a pole of it over the jet escaping from a kettle of boiling water and bend the bamboo to the shape shown as you have laid it out full size over a piece of paper. The bamboo will have to be uniform as to the size of it or the bends will be irregular.

Notice that the rudder's bottom edge is extended so that it can be lashed to the fuselage stick. The rudder is built to the size shown in the same way that the tail surface is built. When covering the rudder and the tail surface, use the Jap tissue which is laid out under the surface to be covered and the wrinkles all smoothed out. The cut is made to conform to the shape of the surface and allow about a ¼-inch overlap so that the lap can be covered with the banana oil to stick it. The banana oil is put on as a last coat all over the tissue when the joints are dry. It serves to toughen the surface and will make it dry tight. Banana oil can be bought at any drugstore, and it should be applied with a small camels' hair brush which can be bought at the same place.

Lay the surfaces under books when drying to make sure that the result will be a flat surface and not twisted out of line.

Wing Has Dihedral

The wing has a lot of dihedral in this design. It helps to stabilize the model, helps it to fly slower, which is a good thing for an indoor model, and can be imparted by steaming the balsa leading and trailing edges.

The wing is built the same way as the other surfaces. Only the dihedral is built in first, the wing tips of 1/16 by 1/16 bamboo are lashed on, the wing ribs, spaced four inches apart are of 1/32 by 1/32 and are then ambroided.

The paper is fastened with banana oil beginning with the center rib which is painted with oil and the paper attached. When dry you must proceed outward by sections, both front and back, and work carefully, without tacking too much at a time, to insure smoothness. The edges are then turned over and smoothed down as were those of the rudder.

The blank for the propeller is cut as the drawing shows. The propeller can be either right hand or left hand. The drawing showing how the knife cuts are taken shows a right hand propeller and the other one shows a left hand propeller. The left hand propeller will wind up easier, turning to wind like a clock's hands and the right hand prop will wind in the other direction. It does make only a little difference in favor of the left hand prop, so use your own choice. When completed the blades must not be more than 1/32-inch thick. The hub thickens a bit for the shaft, say about 3/32. The ends are rounded off. The end of the shaft is put through the prop, if necessary with a No. 70 drill, and the end bent over and ambroided down.

Test for Balance

The model should balance about half way of the chord of the wing, which can be slid back and forth until the right balance is obtained. To make the model curve in flight the rudder may be bent by breathing on it until the warmth of the breath bends the bamboo. The amount of curvature depends upon the size of the room in which the model is flown. The number of turns imparted to the motor can best be determined by experiment, the best probably being about 750 when fully wound. The first trial should be with 100 turns.

This model is very resilient, and cannot be easily damaged, though if you want to you can build an r.o.g. landing carriage as the drawing shows. This will make the model take off in a few feet, and will probably help it in landing.

Giant Stone Bridge Acclaimed One of Nature's Wonders

MOTHER NATURE may never have taken a course in engineering but in this natural bridge at left she has constructed a piece of work that has been standing for thousands of years and will continue to do so for thousands more. The Rainbow bridge is located in Utah. It is, however, reached only by pack-train from Gallup, New Mexico. The huge stone arch is 309 feet high from the base and measures 278 feet in width.

Flood Ruins Film Equipment

EXPENSIVE sound-reproducing apparatus, cameras, films, tents and personal belongings were destroyed and a group of American movie actors were all but swept away themselves by an unexpected flood while they were "on location" on the banks of the Nile river in the wilderness of Africa.

Escaping being devoured by crocodiles only because the huge reptiles were filled with food and provisions, members of the party had as close a call as even the bravest in the company wanted.

The actors were making talking pictures of the famous book, "Trader Horn," and the scene of operations was nearly 60 miles from the nearest outpost in the Congo.

Unnoticed by them, a large quantity of water gathered in a canyon behind them. This was considerably swollen by a recent cloudburst, with the result that it suddenly washed through a gorge and poured down on the camp. The food supplies littered about attracted a school of crocodiles, and only the fact that the alligators were able to absorb such a large quantity of food saved the party.

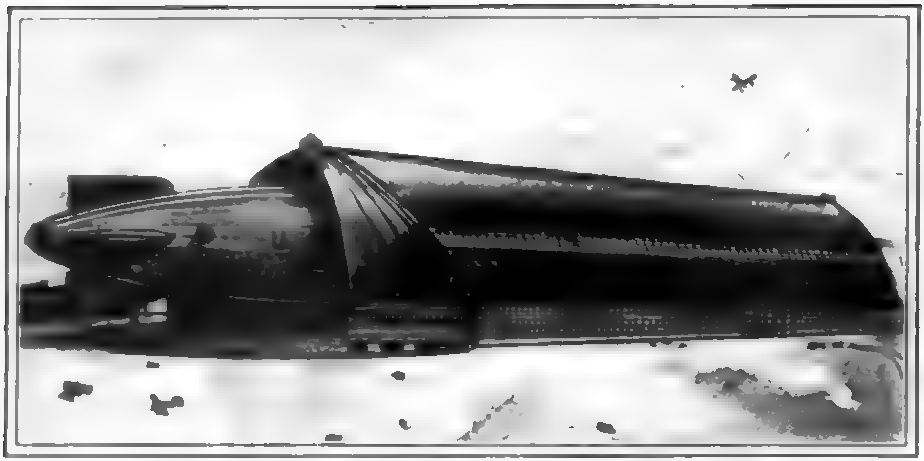
The pre-arranged visit of a river boat the next day saved the little movie colony from any great suffering, but had it not arrived their position might have become most dangerous.

Harry Carey, who is playing "Trader Horn," lost all of his wardrobe.

A New Barrel-Mover

A TWIST of the handles of this new barrel-mover shown below turns the "toes" of the conveyor so that they edge under a barrel and keep it on the truck while it is being moved. An adjustable hook catches the top rim of the barrel and holds it tight to the arms of the truck. A tremendous saving in time is effected by this device, as well as making the handling of heavy barrels safer and easier. Many oil companies have adopted this means of transporting loaded drums around their warehouses and bulk stations.

Affords safety for workmen handling barrels



A unique feature of the mammoth new hangar will be doors swinging on tracks. These are to be segmented like orange peels. Greater wing protection is afforded by this method of construction.

MONSTER BUILDING to be WORLD'S Largest Hangar

FOURTEEN football games could be played at once in the giant dirigible hangar now being built by the Goodyear Zeppelin Corp., at Akron, Ohio. In the structure will be housed the two new 6,500,000 cu. ft. Zeppelins recently ordered for the U. S. Navy. The building is the largest hangar ever attempted and when completed in 1930 will be the largest building without interior supporting pillars ever erected.

This feature—pillarless floors—brought the engineers up against a problem which was unique in the annals of structural engineering. How would the tops of the arches be put in place? The tallest cranes in service would reach no more than half way up the sides of the building.

Here is the clever way in which the problem was solved:

Frames for the lower sides of the arch were erected on pile foundations, and supported by posts. Between them the top section of the arch was put in place, and a wire stretched between the temporarily loose ends to keep the shape of the arch preserved.

Then weights were hung as counterbalances over the ends of the perpendicular posts, and a small amount of power was all that was required to raise the arch. Just like raising a window sill! The drawing at the right explains graphically how this feat was performed.

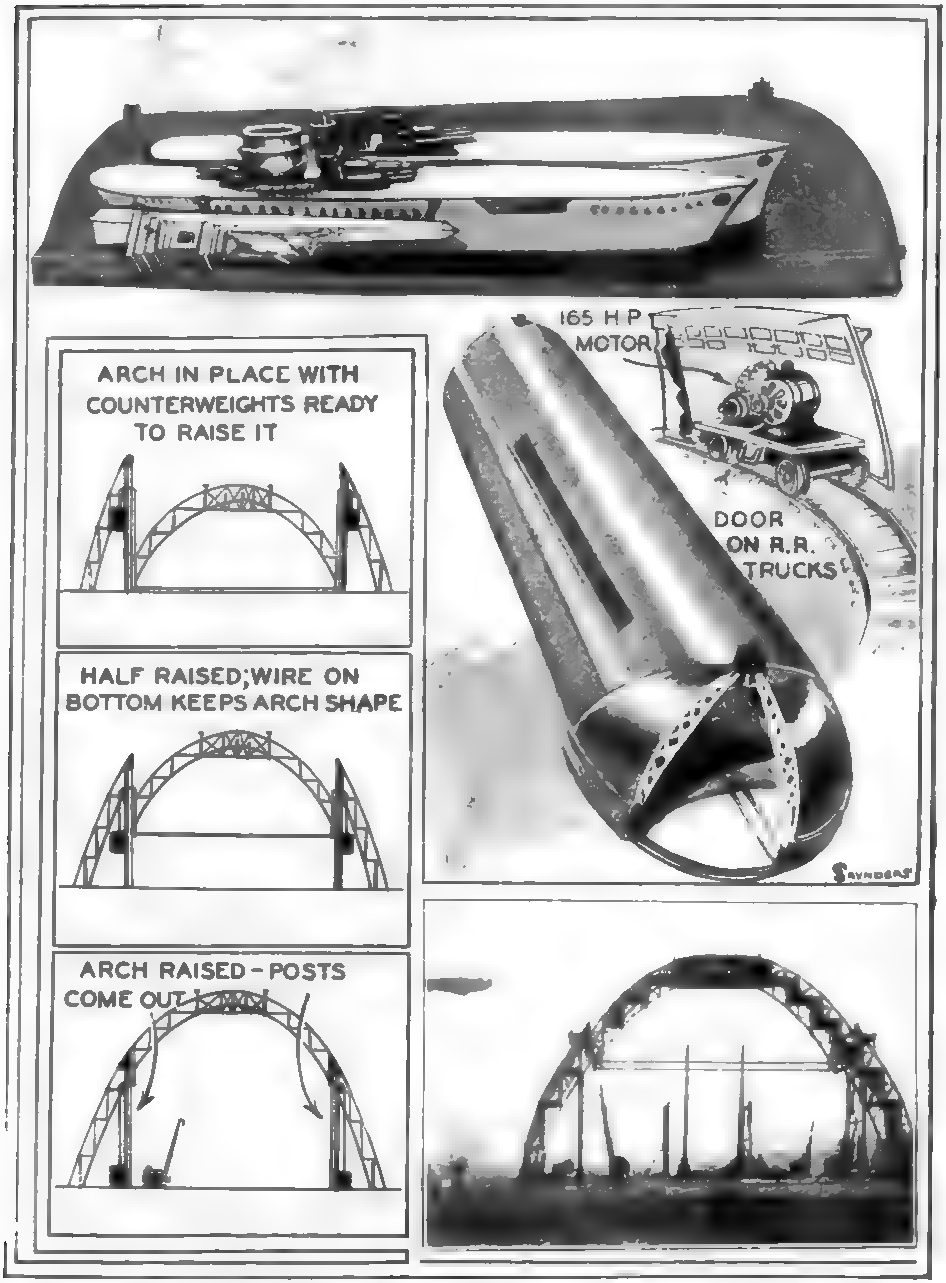
A concrete idea of how huge the building will be may be gleaned from the figures: Length, 1200 feet; width, 325 feet; height, 200 feet; *unobstructed* floor space, 390,000 square feet.

Six thousand tons of steel were required in the order, 7000 cubic yards of concrete, and 1300 piles.

In other words, the hangar is so large that the U. S. S. *Lexington* and the U. S. S. *Saratoga*, Uncle Sam's newest airplane Mother ships, together with the Washington Monument and the Statue of Liberty could be comfortably housed within the hangar.

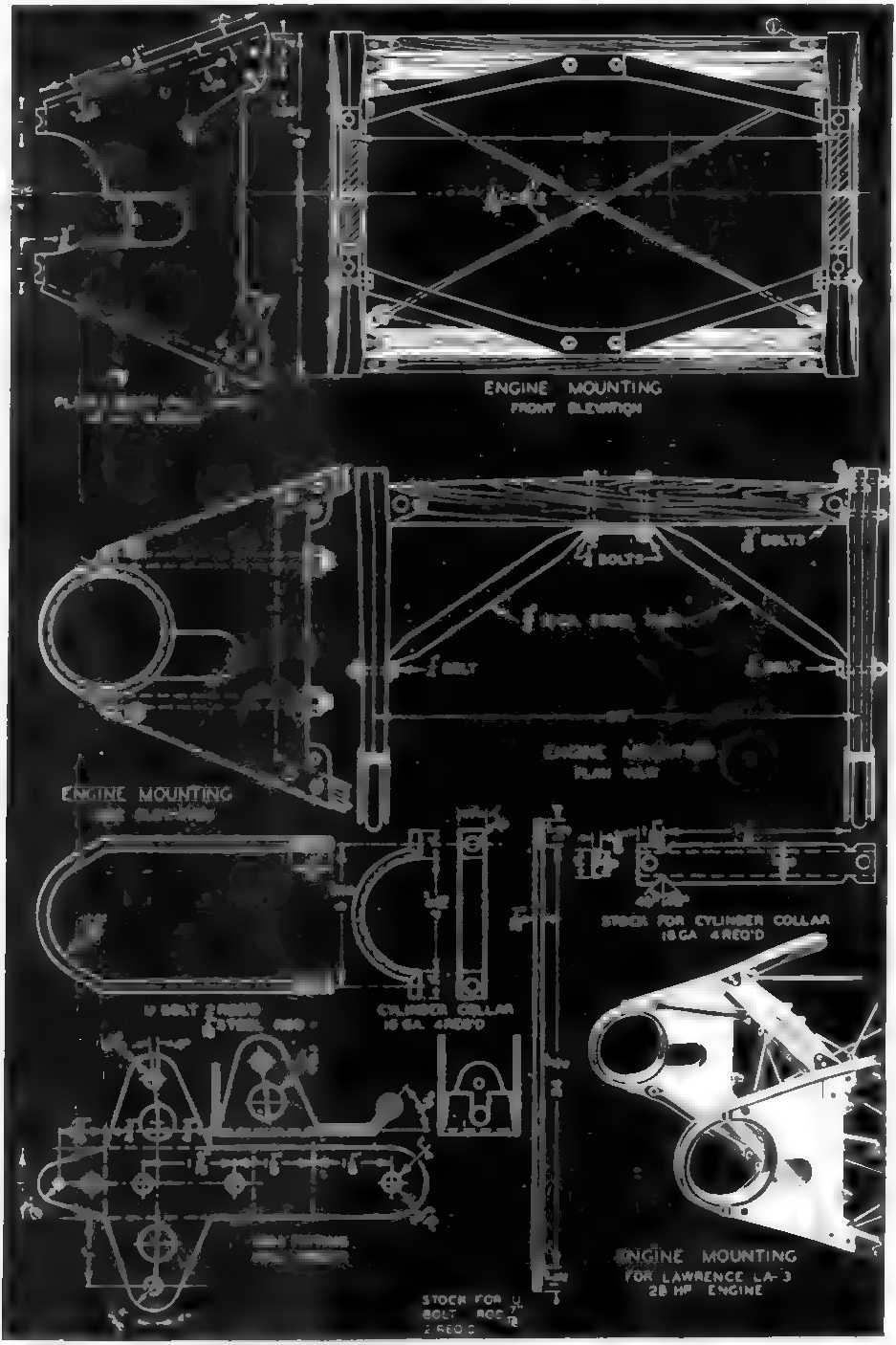
Engineers from all over the world watched the raising of the steel span into place. The span was hung in place over night, being held by 288 tons of counterweight, and at the dawn of a working day 75 men were on the job and within an hour had the span raised. Twelve more arches such as pictured will be required. They will be erected at the rate of three a week.

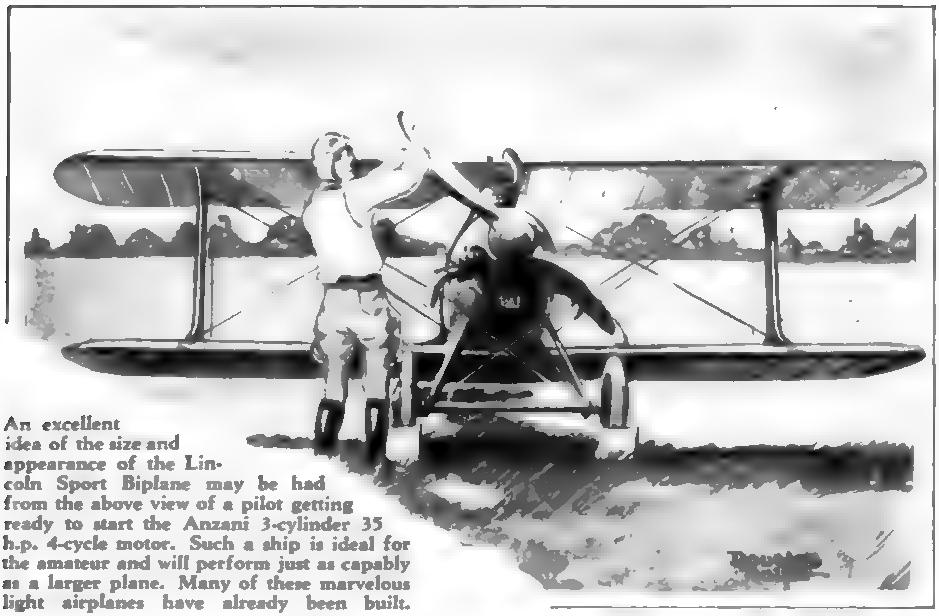
Enormous Hangar Could House Two Battleships With Room to Spare



The Lexington and the Saratoga, together with the Washington Monument and the Statue of Liberty could be housed with room to spare in the new hangar. Segments of the doors run on tracks and are opened by electricity. The method of raising the arch with counterweights is graphically depicted. The photo in the lower right hand corner shows the arch in place immediately after hoisting.

Blue-print Shown Below Gives Engine Mounting for Opposed Types





An excellent idea of the size and appearance of the Lincoln Sport Biplane may be had from the above view of a pilot getting ready to start the Anzani 3-cylinder 35 h.p. 4-cycle motor. Such a ship is ideal for the amateur and will perform just as capably as a larger plane. Many of these marvelous light airplanes have already been built.

Building the LINCOLN BIPLANE

Details for the immensely popular little biplane are concluded in this issue, which will put the reader in possession of a complete set of detailed plans for one of the best light planes of the day.

AS WE glide into the last details for the building of the Lincoln Sportplane let us take a summary of the plans which we have had laid before us and from which the ship is to be built.

The July issue contained the first of the plans, and carried all the dope about the performance and the main layout. The fuselage fittings, the plan view of the fuselage and the wings, the U. S. A. 27 wing section (which, by the way, is obtainable upon application from the National Advisory Committee for Aviation, Navy Building, Washington, D. C.) and the interplane strut and landing carriage details were shown with explanations in that issue. The following month, August, took up the engine mounting, wing mounting, fuselage, strut fittings, stabilizer parts and wing fittings. This issue completes the set of drawings. Anyone at all familiar with the building of an airplane will be able to construct the Lincoln Biplane from the set of details provided through these pages of MODERN MECHANICS.

Should the reader wish, he may secure a set of blue prints for the construction of this ship from the designers, the Lincoln Standard Airplane Company of Lincoln, Nebraska. The price of these prints is five dollars, and though no more complete than the set of plans which the magazine has presented, they are shown to somewhat larger scale and possibly might be a bit easier to work from.

The blueprint on page 144 of this issue shows how the Lawrence engine mount is made for the plane. The Lawrence mount-

Typical Views of Biplane

This head-on view of the nose of the little ship shows a model equipped with the Lawrence two-cylinder motor.

The model shown in this view was equipped with the R. A. F. 15-wing section, a high speed wing.

The ship shown above, built by Mr. Fred Trump, is being lined up in a stubble field preparatory to a take-off.

ing is peculiar in that there are no points of attachment about the engine such as bolts, etc. The mounts for the old Penguin planes in which the Lawrence engines were used were merely u-bolts attached to the lower ends of the cylinder barrels. Use is made of this feature in the Lincoln Sportplane if one wants to use the Lawrence.

The wing may be covered with Grade A cotton cloth. The loading per square foot is not 51½ pounds per square foot as was at first printed, but only 5½ pounds. For such a loading, well doped cotton cloth is ample as to strength and lasting qualities. The wing is covered in the usual way by making the covering a tight fitting sack, putting it onto the wing like a stocking, and then sewing it to the ribs. The sewing stitch is merely a tightly made loop about every four inches along the wing ribs.

Start the stitch on one side of the rib, poke the needle through to the under side of the wing, and then bring the thread up through the top again on the other side of the wing.

The blueprint on the accompanying page shows several details worth mentioning at length. Among these is the splice in the wing spars.

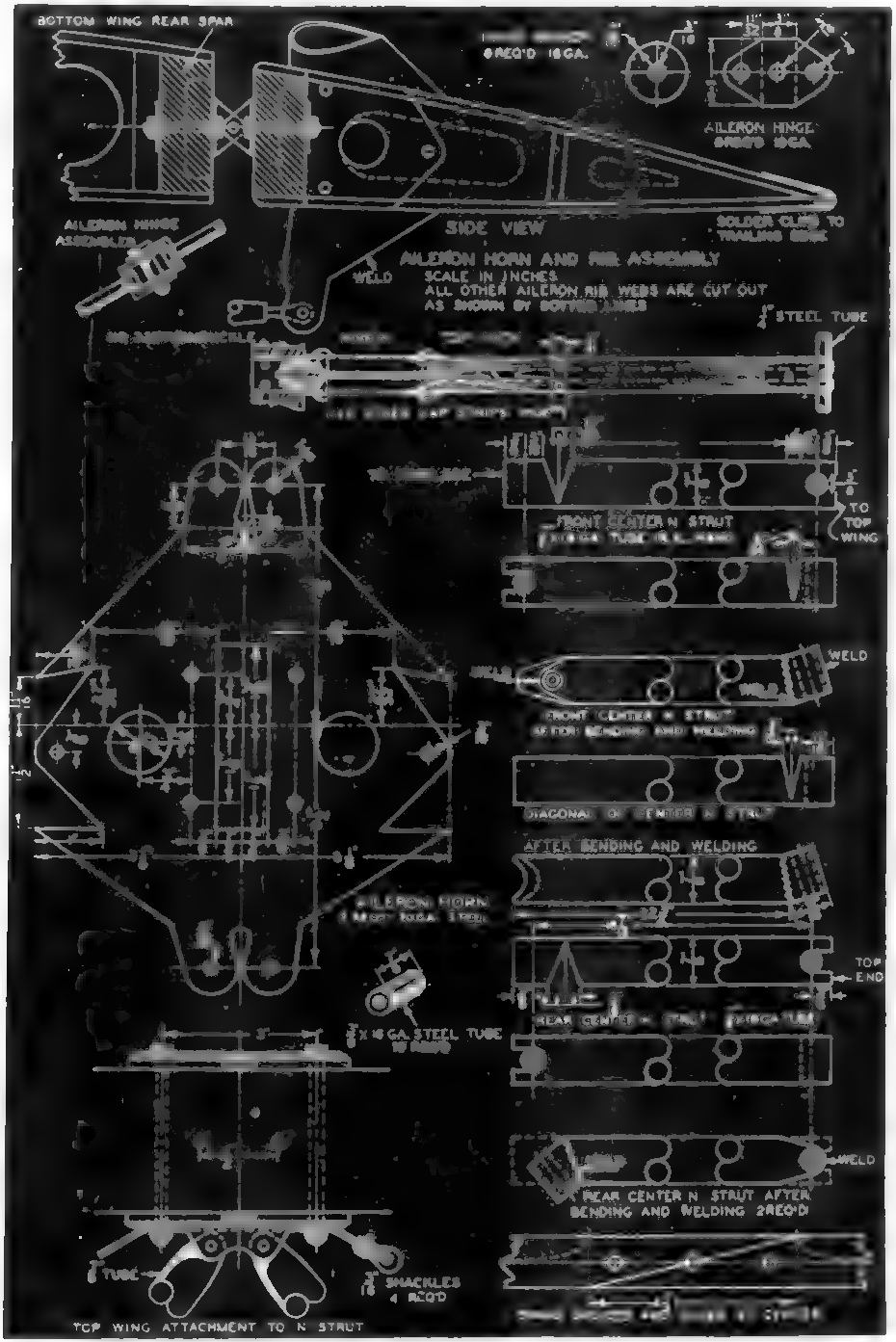
As previously mentioned the dihedral in this design is built in the wing. The spars are spliced at the centers where the cabane strut is mounted and are glued with Curtis cold water glue. The method of joining the spars is shown in the drawing at the lower portion of the page. In the view which may be identified by the dimension 4½ inches showing the length of the splice, it will be noticed that there are ostensibly three holes for bolts. The outer ones are used for the fittings; the center one is a dowel pin.

The aileron control horn is a complicated piece of cutting and should be laid out flat, cut, and then bent, and drilled the last thing so that the holes will be in line.

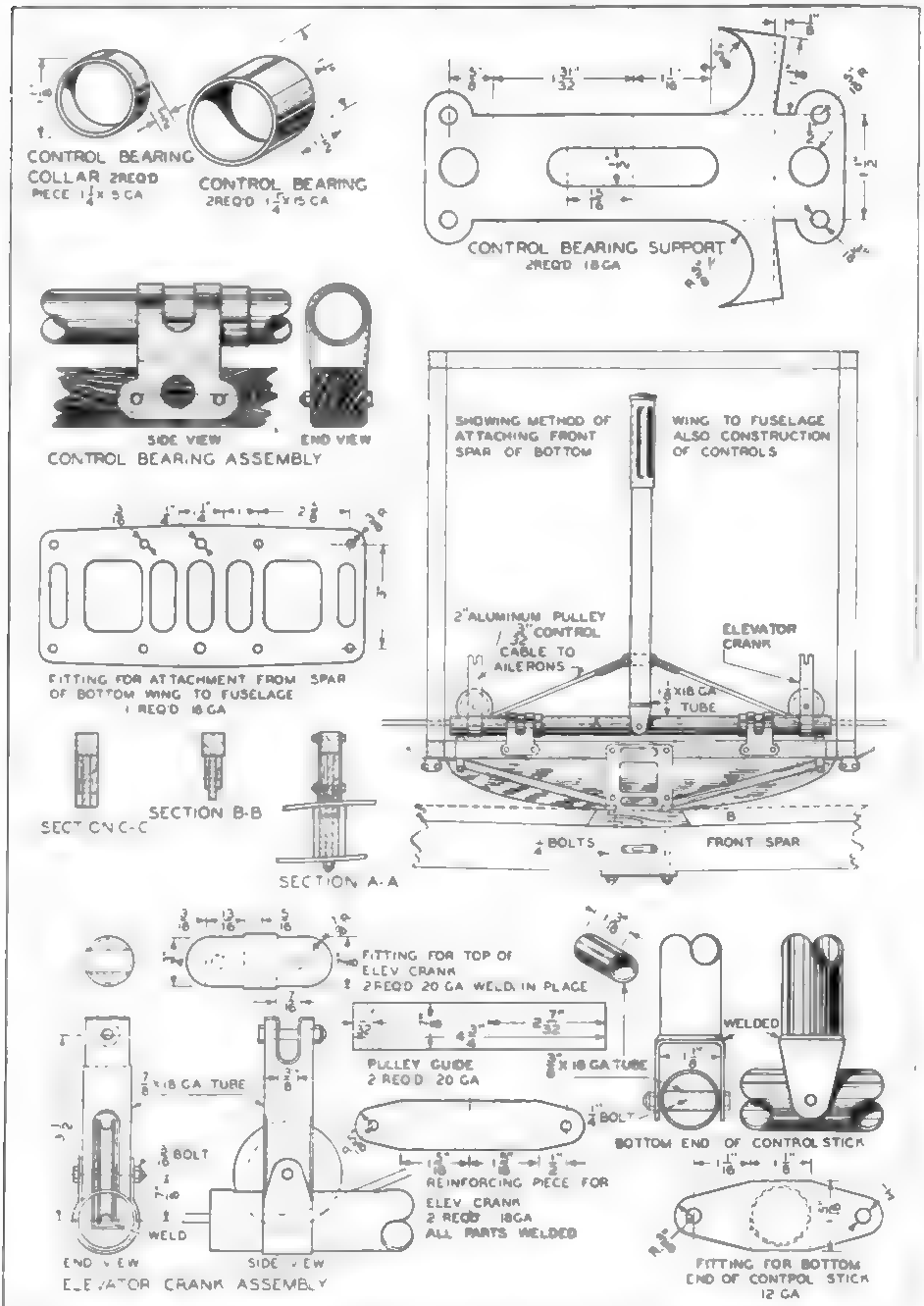
The method of making the center section n-strut, or cabane is shown. The welding had best be done by a man used to the work or much tubing will be wasted before a satisfactory job results. The welding of tubing is in itself an art, and all welders are not tubing welders by a long way. The application of the oxy-acetylene welding flame to light tubing such as this is very apt to thin the metal on each side of the weld and nine times out of ten if failure occurs it is at this point and for the above reason. In all points the skill of a welder will be found well worth while.

The accompanying blueprint also shows the Lincoln method of building the trailing edge of their wings, as will be seen from the cross section of the aileron. Quarter-inch by 22 gauge steel tubing is used for this, and is secured to the wing ribs by copper strips. The copper is soldered to

Aileron Fittings Shown in Diagram Conform to Best Airplane Practice



Control Stick Assembly Simple and Effective; Parts Are Shown Here



If these directions are followed closely, construction and assembly of the control stick will be an easy task and one that the builder will get a great deal of enjoyment out of performing for himself.

the tubing, nailed to the rib, and the nail heads soldered to prevent their coming loose.

The aileron hinges are simple and are readily made out from the drawings. The method of fastening them together is shown. The clevis pin, a standard 3/16 item is used and anchored with a cotter pin.

It is recommended that the builder of this plane, should he wish to fly it, take time from some accredited instructor. It will be the cheapest in the long run and will enable the student to keep his plane intact until he has acquired enough air sense to instinctively do the right thing when an emergency arises.

MODERN MECHANICS does not advocate the student teaching himself to fly. If, however, he wishes to try it and risk a faulty move which may endanger his ship, here is the way to go about it.

On the takeoff, after the motor is warmed so that giving her the gun will not load her up and kill it, the ship is lined directly into the wind. Choose the early morning or the evening before the sun goes down. The air is then heavy, lifts well, and is not bumpy as a general rule.

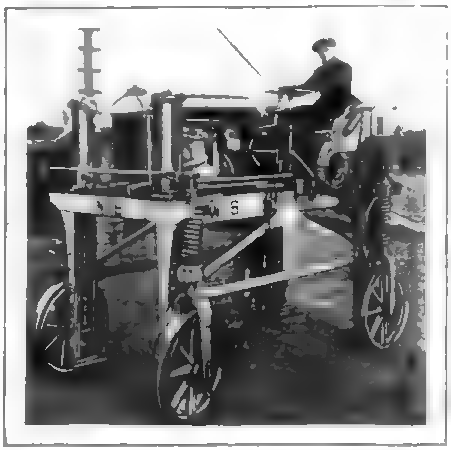
The throttle is gunned wide out. The stick is shoved way forward so as to lift the tail off the ground. When the nose of the ship is on a line with the horizon the stick is eased back as the ship gains enough speed to keep the nose there, and finally a slight nudge back will lift the ship off the ground, and you are in flight.

Care must be taken not to climb too fast and stall the ship. As a stall approaches the aileron controls become soft. Nose the ship down to regain control.

When about four hundred feet of altitude have been gained head the ship back into the wind for a landing and cut the motor when, flying straight along in normal flight, the airfield under you forms a line of vision which approximates the gliding angle of the ship. Cut the gun, nose the ship over into this line, and gently dive for the field. About ten feet or so off the ground level off and wait for the ship to begin to settle. Just at the moment you feel the ship begin to settle keep pulling the stick back, settling the tail, until the ship lands on all three points—tail skid and two wheels.

Strange-Appearing Truck Makes Handling Lumber on Docks Simple

CLAMPING a pile of lumber like a huge fist would grasp a small object, this queer-looking truck shown at right is used to advantage on the docks of the harbor in Los Angeles, Calif. The truck is run over a pile with the lumber extending parallel to the length of the truck. Automatic "shoes" slip under the bottom pieces of wood and the pile is lifted clear of the ground by means of a lever near the operator's seat. Use of this truck makes it unnecessary to move lumber very far off the ground when handling.



High carriage allows truck to run over lumber pile, which automatic "shoes" then grasp.

Silencing Street Car Wheels

NOISE at street car intersections is expected to be done away with largely through the use of a "continuous rail" which is being given a trial in a number of cities. It is the invention of W. H. Whalen and includes a small, round plate with a single groove. This is installed at track intersections, where it acts as a miniature turntable and automatically faces in the direction of an approaching car. Thus the bumping over track grooves is completely eliminated, with the result that rolling stock, as well as city dwellers' ears, are submitted to fewer shocks daily.

Simple Methods Save

By NORMAN ROSS, Famous Swimmer
as told to James N. Miller

Norman Ross

Could you be a life saver if the occasion demanded? Do you know how to treat an unconscious person? Norman Ross, world's champion swimmer for seven years, one of the foremost authorities today, explains in the article below the approved ways of reviving a victim.

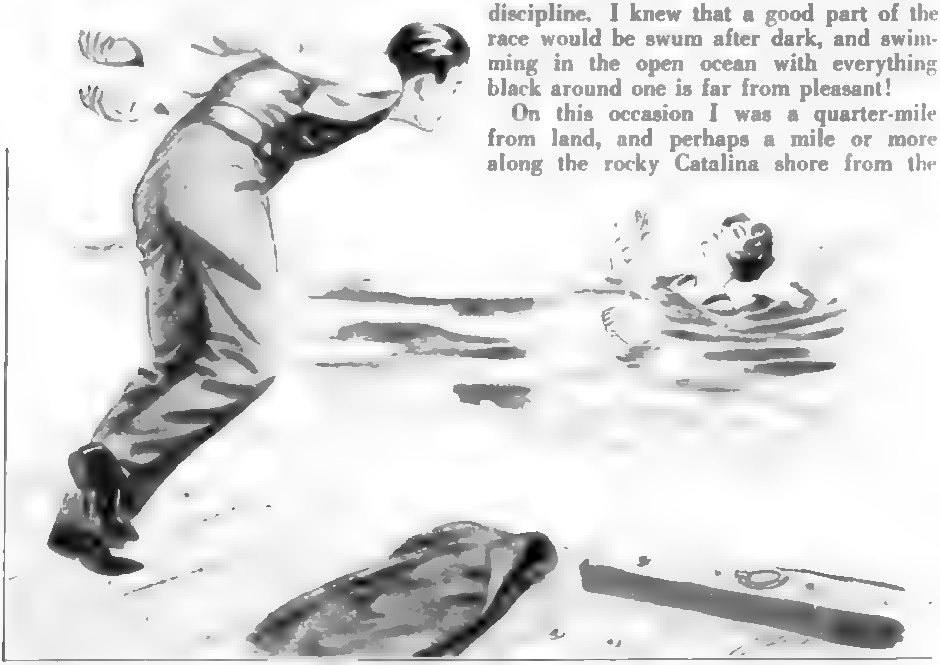
KEEP your head, is my advice to both the experienced swimmer and the beginner, and ordinarily no one need drown. Fear is the swimmers' worst enemy. It makes the desired coordination of mental and muscular effort impossible. Statistics show that most drownings occur within 30 feet of safety because the swimmer becomes panic stricken.

Especial emphasis is laid on the warning against swimming alone, where no help is available in case of exhaustion. No matter how good a swimmer a person may be, he should very rarely go in the water alone. Many things can happen, and the aid of a companion may be the vital factor in saving his life in case of an accident.

I know that in my own case, during the seven years I was champion of the world, I had several scares while swimming that would have caused a less experienced or more nervous person to become panic-stricken and probably lose his life, with no aid at hand.

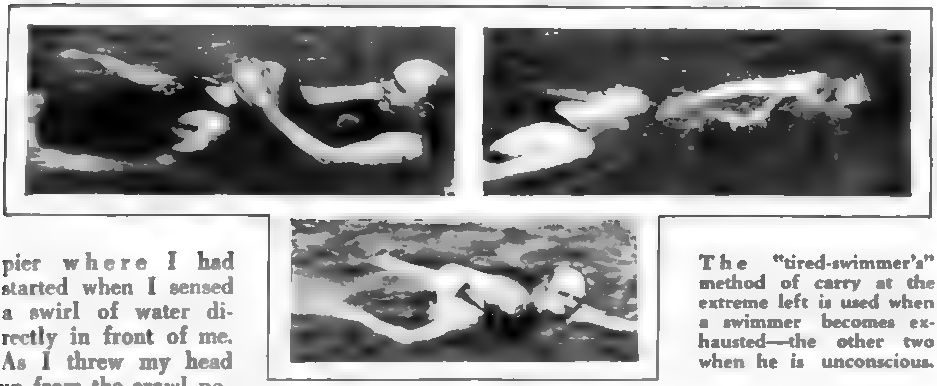
Once in particular, while training for the $25,000 Wrigley swim at Catalina, I was forcing myself to take long swims after dark. This was done as a means of mental discipline. I knew that a good part of the race would be swum after dark, and swimming in the open ocean with everything black around one is far from pleasant!

On this occasion I was a quarter-mile from land, and perhaps a mile or more along the rocky Catalina shore from the



If your sweetheart or sister fell off a dock and were drowning, could you save her?

DROWNING *Victims*



The "tired-swimmer's" method of carry at the extreme left is used when a swimmer becomes exhausted—the other two when he is unconscious.

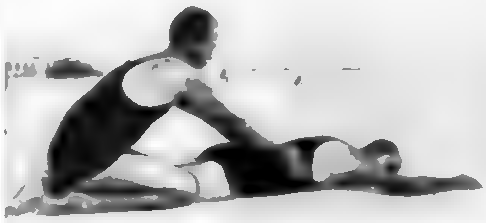
pier where I had started when I sensed a swirl of water directly in front of me. As I threw my head up from the crawl position I saw a huge body of some kind cleave the water and sink. There had been several shark scares among the swimmers training at the island, and I therefore nearly fainted from fright.

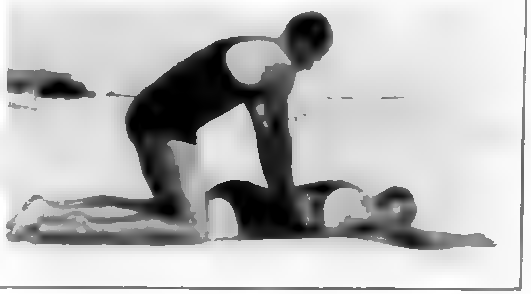
A loud snort and puff of outblown air as the sea-beast came to the surface announced to me that my friend was a huge seal. This served to lessen my consternation a bit, but I was not myself all the way back to shore.

No one is ever safe alone in the water unless he can put his foot on bottom. Then he is not entirely safe if there are tides, currents or waves present which may dig out the sand, cause an undertow, or carry the weak swimmer away from safety.

The American Red Cross has accomplished

Brrr! Norman Ross "warming up in the snow" on a Chicago pier off Lake Michigan during winter.





Here is the Schaefer method of artificial respiration: Lay the victim on his stomach, with one arm over his head. His tongue should be pulled out and any debris that might hinder his breathing cleaned from his mouth. The rescuer straddles the subject's thighs with his knees. He then places the palms of his hands on the small of the prone man's back, with his fingers resting on the ribs. With his arms held straight, he swings forward slowly so that his body weight is gradually brought to bear upon the patient. The pressure is then released suddenly allowing the lungs to inflate. If this is done correctly, artificial breathing is produced. This operation should take only about two seconds. Repeat 12 to 15 times a minute.

wonders in decreasing the number of drownings within the past ten years. During that time, the death rate from this cause has been diminished more than 22 per cent. This has been accomplished through education of the public in the methods of saving lives.

Probably the greatest forward step in life-saving has been the introduction of training in use of the scissors kick in conjunction with the side-stroke. The Schaefer treatment of artificial respiration has also been of great importance, and has served to revive thousands of persons who almost met their death by drowning. Here the Red Cross differs sharply with the standard European methods, favored particularly by the English and Germans. They believe that only experts in the breaststroke can become trustworthy saviours of drowning people. Why then, do the Americans favor the side-stroke, which utilizes the scissors kick? Because the side-stroke can be mastered far more readily by the new swimmer than can the breast stroke, which requires difficult coordination that often takes years of practice to achieve. Surprisingly soon, on the other hand, a mere beginner can develop a powerful scissors kick. By using his legs only, he can learn to swim with ease on his back or side. Meantime both arms are entirely free for the all important maneuvers aimed at saving the life of the drowning person.

But what about the crawl stroke, emphasized so much in the past? Where does that enter the rescue situation? Not very strongly. First, because it does not let the rescuer relinquish the use of either arm while trying to aid a sinking swimmer. Secondly, because it employs the flutter kick, considerably harder to learn than the scissors.

As for the Schaefer prone pressure method, no special "machinery" is required. Only a nimble pair of hands is needed, and the method can be mastered readily. It is a simple and natural way to revive a person by forcing air from the lungs. It is also effective for other types of suffocation such as gas and electric shock.

Many erroneous beliefs about water rescues ought to be cleared up. For instance, the idea that a drowning person actually "pulls down" his would-be rescuer. This

is not true. Instead, the struggling one either climbs upon his saviour or tries to push him down. Then again, many think that the life saver should emphasize particularly the need of learning how to break death grips. In reality the main reliance should be upon how best to prevent them.

But should the drowning swimmer be "socked" deftly so as to make him manageable? Never, says the Red Cross. Instead, the water should be allowed to subdue him, a situation happening naturally if the victim continues to lash and strike about.

Another little known fact is that a person can usually be revived even if he has been under water 15 minutes or more, granted that resuscitation is used at the earliest possible moment following the rescue.

How to break strangle holds clamped on a rescuer by a drowning person is shown in the two upper photos above. If the would-be life saver is clamped tightly about the neck from the rear, he must turn his head in the direction he is going in order to twist the victim and thereby protect his throat with his powerful neck muscle. Circular inset shows Comm. W. E. Longfellow, who is fondly called "daddy," of the American Red Cross.

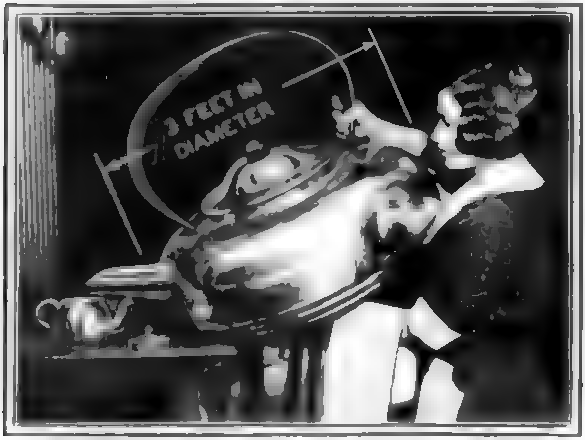
Life savers are now taught that drownings do not result because the lungs fill with water. Autopsies show that there is little or no water in a drowned person's lungs. The cause of death is suffocation. The air supply is cut off, although the heart action continues for a while. This causes the blood to be poisoned by the accumulation of unexpired gases. When water is swallowed it goes into the stomach, not into the lungs.

Eighty-five per cent of the drownings throughout the country have one of four causes: First, when the victim was swimming alone with no help available; second, when stomach cramps or indigestion, due to swimming too soon after a hearty meal, cause the knees to double up under the chin, making the victim sink quickly; third, when fear comes from muscle cramps in arms or legs; fourth, when a person dives into unfamiliar water.

Another main point stressed by Red Cross experts is that a "swimming rescue" should always be regarded as a last resort —it should be used only when neither boat nor buoy is available. Most of the methods of carry taught by the Red Cross enable the rescuer to hold the drowning person with one arm in a position permitting perfect control, while the other arm can be used for swimming. But even before the struggling swimmer is approached, the would-be rescuer must be taught that the safest approach is from the rear. When this is im-

(Continued on page 182)

Huge Kettle Affords Tea Room Customers Hot Stimulant



THERE is an old saying that an Englishman can't do without his tea. The manufacture of this huge kettle shown at left seems to bear this out, for it was made for the purpose of being able to brew large quantities of tea to accommodate the hundreds of persons who drop in a prominent tea room in London at any time of the day or night and demand a stimulant. A study in contrast is afforded in the photo in which a young woman is pouring tea from the immense kettle into an average sized tea pot. Ordinarily she would not be able to lift it so easily, but the kettle is nearly empty. It has a capacity of approximately 20 gallons and weighs 15 pounds.

Skims Over Tops of Capital

ATTENTION of Representative Melvin J. Maas of St. Paul, Minn., the "flying congressman," was recently called by the War Department to his alleged infraction of the air traffic rules in Washington in regard to flying too low over the business district of the city.

Workers in government buildings near the Lincoln Memorial were startled by the roar of an airplane motor close to the tops of the structures. Complaints poured into the Commerce Department by telephone.

Representative Maas explained that he was practising landing at a point across the Potomac river and that he didn't realize that he was coming so close to the buildings.

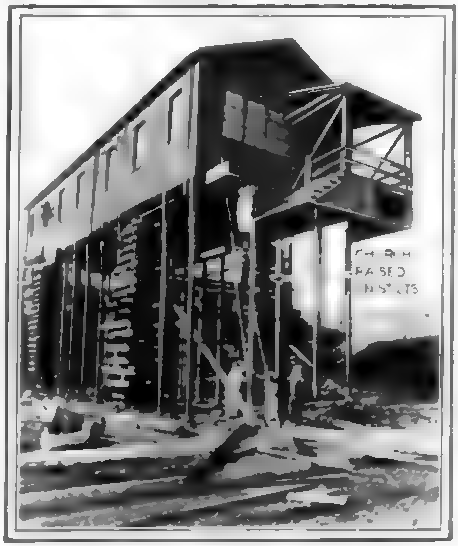
Train Crew Plays Tag with Cars

GENTLE breezes turned into powerful gusts of wind recently in northern Minnesota and a miniature cyclone chased eight railway stock cars down the track at a terrific rate of speed. Members of a train crew seeing the runaway cars disappearing set up a pursuit in gas cars, and the chase developed into one that might well have been interchanged with any of those usually employed in a movie comedy.

Had there not been a curve that swung the cars broadside to the wind, the crew might still be following the speeding cars. However, the wind hit the side of the cars and lifted two of their wheel trucks from the track, bringing the wild procession to a halt in a nearby gully.

Raise Church to Level Gulch

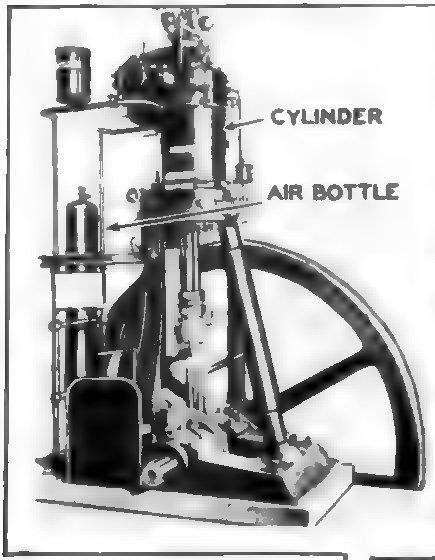
SUPPORTED on stilts while the gulch in which this church stood was being filled with soil, the building now rests on level land. Real estate owners recently decided to fill up the gap and make a level street. Old lumber was used so that when the stacks were surrounded by dirt they would not have to be removed.

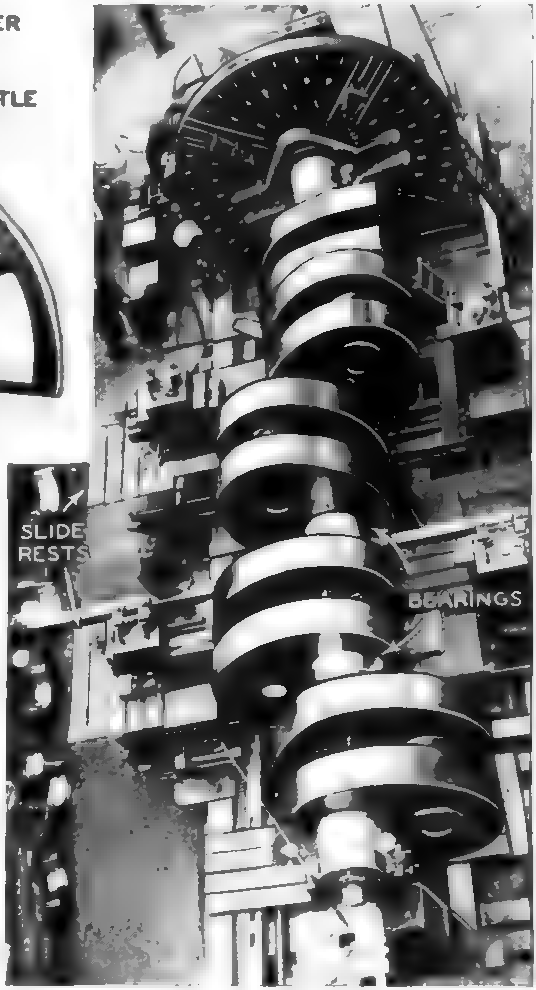


Workmen shown putting stilts under church.

Huge Crankshaft to Propel Motorship

Diesel engine on new British ship "Britannic" will be one of largest ever built.





Above is shown the original model of Rudolph Diesel's internal combustion engine, dating from the year 1897. At right is a photograph of the huge crankshaft of one of the Diesel engines which will drive the motorship Britannic. Note its size in comparison with the human figure at the slide rest.

ONE OF the largest Diesel engines in the world will go into service shortly with the launching of the new motorship *Britannic* of the White Star line. The crankshaft of the engine, shown in the photo at the right, gives an adequate idea of its tremendous size, and presents an interesting contrast with the dimensions of the first Diesel engine built 30 years ago.

Rudolph Diesel, the German inventor who perfected this type of motor which burns crude oil instead of gasoline, was accidentally drowned in the English Channel while traveling to London shortly before the World War, but since his death the motor has been making tremendous strides in popularity. Only recently a Diesel engine for airplane use has been built by the Packard Motor Company which, on its initial flight, consumed less than one-fifth the amount of fuel that a gasoline engine would have required. It is this very ability to operate on a minimum amount of fuel which makes the Diesel engine popular for marine use, since it enables space otherwise required for fuel bunkers to be utilized for cargo.

Diving Under Water

By HI SIBLEY

Build this simple bathers' sub and introduce it to the gang at the swimmin' hole or lake. Mr. Sibley explains in the article below how to construct it.

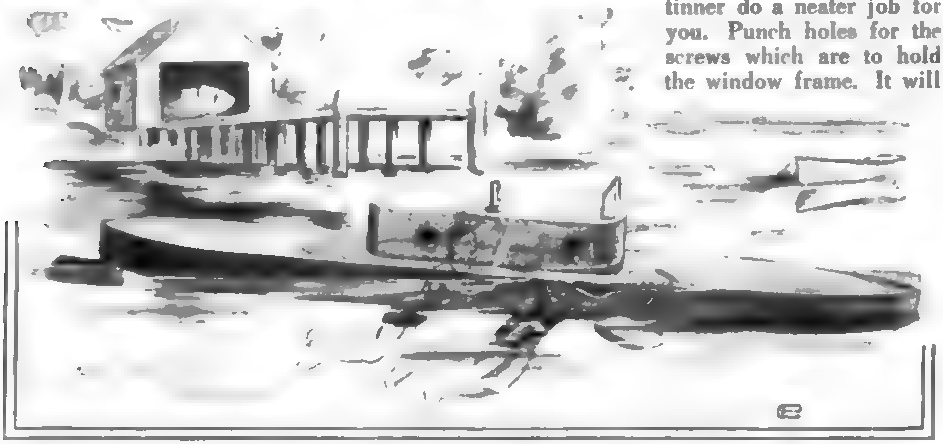
BATHERS who have tried all types of surface craft will enjoy the novelty of under-water cruising in this little submarine. Besides being light and easily maneuvered, the crew can escape from it instantly in any emergency.

Since the air release is in the nature of a check valve, the sub can dive only when the crew wills it, and very little effort is required to bring it to the surface again. It is not intended to submerge completely, but will cruise with only the top of the conning tower visible. Sufficient air is retained for "pilot" and "engineer" to breathe comfortably for a considerable time while submerged.

Construction is the simplest possible for a water-tight boat. Start with the deck, using two boards ¾ in. thick, 9 in. wide and 8 ft. long, rounded at the ends and with a central opening for the conning tower. Before putting the boards together with battens, bevel the inner edges slightly so that there will be a V-shaped crack to receive caulking. For the sides, use ½-inch or even ⅜-inch by 6-inch wood. First lay strips of muslin along the edges of the deck boards and soak with white lead. Then screw a side piece to the bow post, tying the ends together with a piece of galvanized sheet, 6 in. by 8 in., as shown in the drawing. Now work toward the stern, nailing down the side piece as you go and taking care there are no wrinkles in the muslin strip which is to make the seam water-tight. The stern is made the same as the bow.

Caulk the V-shaped crack through the center of the deck by driving in cotton with a wooden "chisel" which does not quite come to a sharp point. This would catch in the cotton and pull it out again. It should be driven in tight, not quite flush with the deck, and soaked thoroughly with white lead.

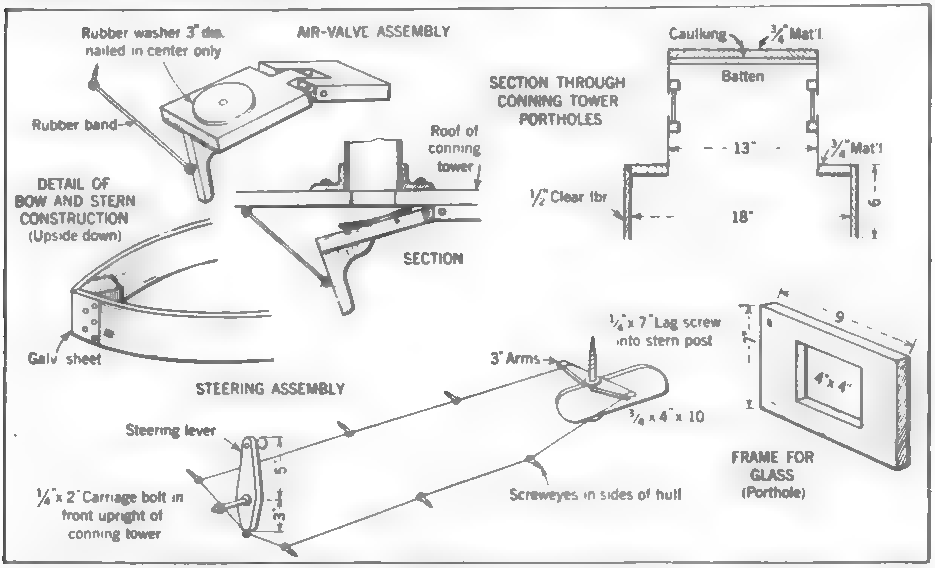
The conning tower consists of a wooden roof and uprights at each end, with galvanized sheet sides. The dimensions call for a length of 32 in. and width of 13 in., with 12 in. height. This is about the most convenient size for the sheeting. However, it may be made larger or smaller, depending upon the material available. Cut the port hole openings with a cold chisel, or have the tinner do a neater job for you. Punch holes for the screws which are to hold the window frame. It will



This novel submarine is complete with periscope, air valve, submerging vanes and steering gear.

in a TOY SUBMARINE

Showing Construction of Air Valve Which Allows the Sub to Sink



Glass port-holes as well as the periscope allow the "crew" to steer the course of the submarine.

be more convenient to install the windows before nailing the sheet to the conning tower frame.

Doubtless there are several better ways of constructing a watertight window, but the method shown is designed for the use of ordinary tools. A glass pane 4 in. by 4 in. is secured in a wooden frame 7 in. by 9 in. by means of light wood strips. The corners are made watertight by pressing in warm tar with the fingers. Do not pour in hot tar as it is liable to crack the glass as well as make a messy job. Heat the tar in a stew pan or kettle set in hot water until it can be worked with the hands. Putty is not satisfactory as it tends to crumble under the action of water.

Cut a rubber gasket from a flat piece of tire tube and draw the window frame tightly to the galvanized sheet with round head screws about ⅝ in. long.

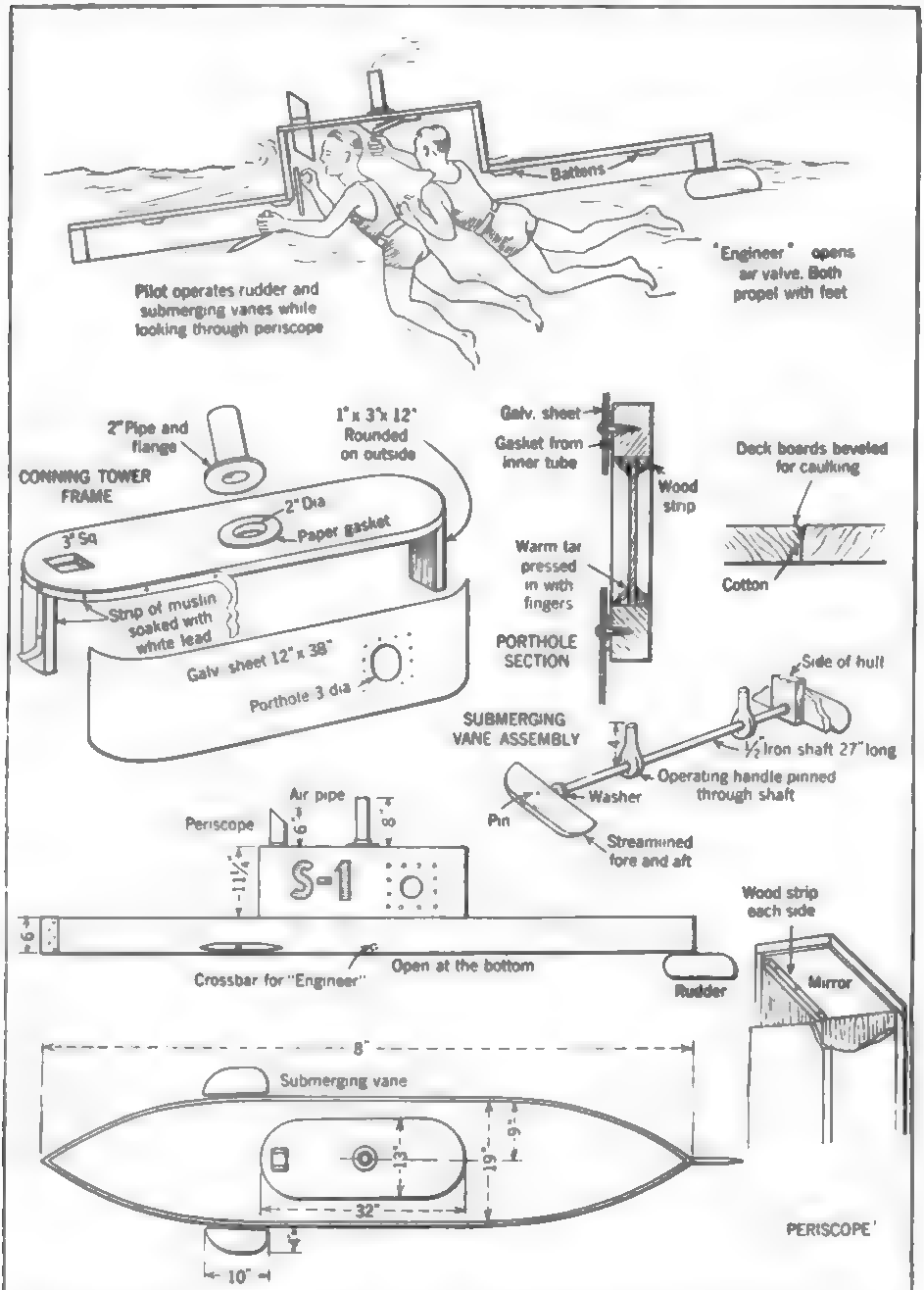
With the porthole lights completed, you can nail the walls of the conning tower to the wooden frame. Lay strips of muslin on the edges of the roof and sides of uprights, as shown, and soak with white lead. Do the same when installing conning tower in deck.

The periscope is simply a box 3 in. square by 12 in. long over all with mirrors set in the ends at exactly 45 degree angles. The latter are held in place by small wooden strips, and should be tested for alignment before sealing the glass panes at the ends. The mirrors can be adjusted by strips of cardboard placed under one end to bring vision in line.

Small brads hold the glass panes in place over the ends of the periscope, and these, like the port lights, are sealed with warm tar. The periscope is set in the conning tower roof so that it extends down into the compartment about half way. Seal the cracks in the roof with cotton caulking or tar.

A two-inch air vent permits rapid exhaust or intake, but can be made even larger if you have the fittings on hand for a larger air pipe on the roof. The check-valve is very simply made, being a hinged block carrying a 3 in. rubber gasket. The latter should be fastened in the middle with one nail only. Attach a handle for manual operation, and a rubber band to keep it in position against the vent. Air pressure in-

Novelty and Real Fun Combined in This Summer Sport



Detailed instructions and illustrations make it easy for anyone to build the marvelous toy submarine that Mr. Sibley explains so interestingly and fully in the accompanying article.

side will keep it tight. For submerging the engineer simply opens the valve to permit some of the air to escape while the pilot deflects the submerging vanes.

Make a streamlined rudder from a board about ¾ in. by 4 in. by 10 in., and bore a ⅜ in. hole for the rudder post about 4 in. from the front end. A ¼ in. by 7 in. lag screw serves as the rudder post, screwed into the stern post.

A cross piece having 3 in. arms carries the rudder "cables," which are operated from the front of the conning tower by means of a vertical lever as shown in the sketch. The cables are guided through screw eyes in the sides of the hull (inside), and the sub turns in the direction the steering lever is moved.

The submerging vanes are secured to an iron shaft about ½ in. diameter running crosswise through the hull. These are pinned to the shaft, as well as the two hand levers inside. A friendly garage man will doubtless furnish the shaft as well as drill the necessary holes for a small sum.

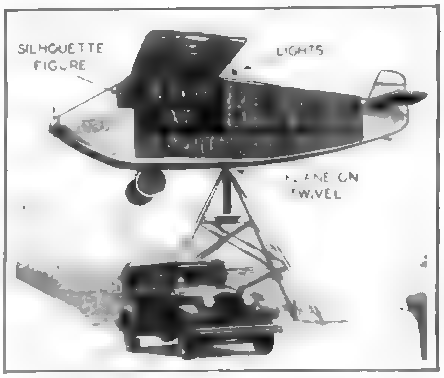
Submerging is accomplished by deflecting the vanes and letting out air while the crew paddles vigorously with their feet. Coming to the surface is much easier than submerging, for there is enough wood in the craft to make it float even though all the air is exhausted from the conning tower.

Battleship gray is, of course, the proper color to paint your sub, but a little splash of color, such as a bright red rudder and vanes will touch it off nicely. If you care to go to the extra expense, a coat of spar varnish will greatly add to its durability and appearance.

This under-sea cruiser is safe enough for boys to take out into fairly deep water, provided they know something about swimming and there is no sea running. In case of battle and the enemy attempts to board the sub, the crew have only to submerge and leave the boarders bobbing about in the sea. Considerable time and some expense is involved in making this unique craft, but the fun you can have with it, and the sensation it will create, will be well worth all your pains.

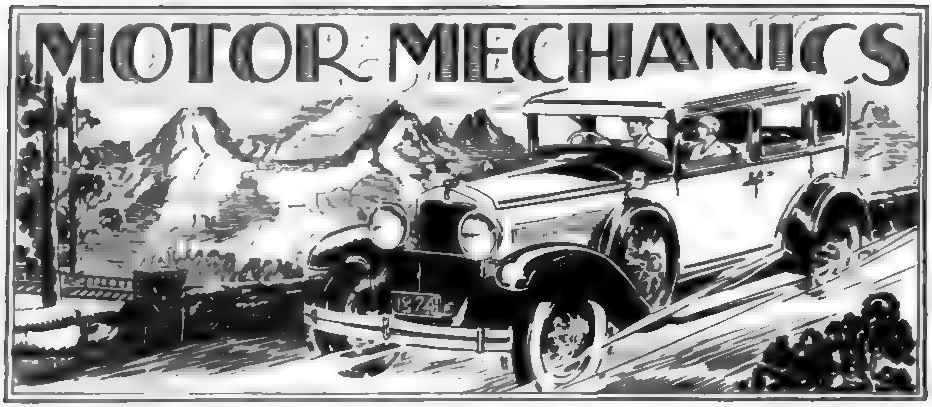
Model Plane Is Used to Advertise Department Store Along Highway

MOUNTED on a swivel and therefore turning easily in the wind, this unusual sign shown at right is used by a department store instead of the common signboard that is placed along a highway. At night, lights illuminate it so that it can be seen a great distance. Advertising managers and publicity directors are always endeavoring to get the name of a person or product before the eyes of the public. Whoever was responsible for this idea has modernized his advertising campaign to "keep up with the times." The propeller whirls with the wind to add to the realistic effect.



Combine Talkie With Radio

TALKING pictures were combined with the radio for the first time, it is believed, at a recent dinner of a large insurance company in New York City. At the close of the banquet a sound newsreel picture was shown of Darwin P. Kingsley, president of the concern, welcoming Calvin Coolidge to the board of directors. The microphone was placed a few feet in front of the screen, and the sound then transmitted via the hotel radio station to all of the 2,200 rooms of the hotel, each one of which is equipped with a radio receiving set. This made it possible for both the dinner guests and those listening in to hear the addresses of Mr. Kingsley and Mr. Coolidge delivered at the time of Mr. Coolidge's induction. The experiment opens an interesting field of speculation as to the possibility of broadcasting talking pictures in the future.



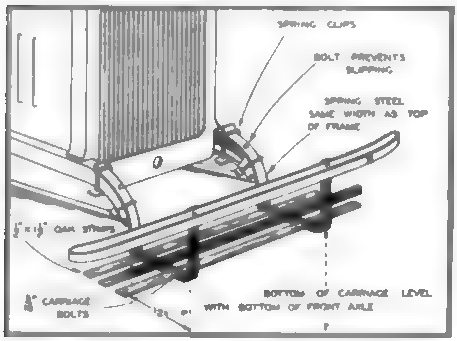
Edited by RAY F. KUNS

Mr. Kuns, editor of this department, is principal of the Automotive Trade School of Cincinnati, Ohio, and a nationally known expert in his field. He is also editor of the Automobile Digest, national auto trade journal. This department of motor hints is a regular monthly feature of Modern Mechanics.

Convenient Luggage Carrier Rides in Front of Automobile

AUTOCAMPERS often find themselves cramped for carrying space for their equipment when planning a camping trip, particularly if a full complement of passengers is to be carried. Much paraphernalia placed in the tonneau adds to the discomfort of the passengers. A luggage carrier, as shown in the sketch, will relieve the situation by carrying a bulky parcel, such as the tent, or the blanket roll.

This style of carrier is applicable to any make of car, but no fixed dimensions and pattern can be given to conform to every make of car. It is best to drive one's car to a blacksmith's or auto spring shop and have the main brackets shaped to fit the individual car. These brackets should be made of ¼" spring steel stock the same width as the frame of the car. It is best to use spring clips to attach the brackets to the frame, as bolt-holes tend to weaken the frame. However, two ⅜" bolts should be used, as indicated in the sketch, to prevent the brackets from slipping out of place.

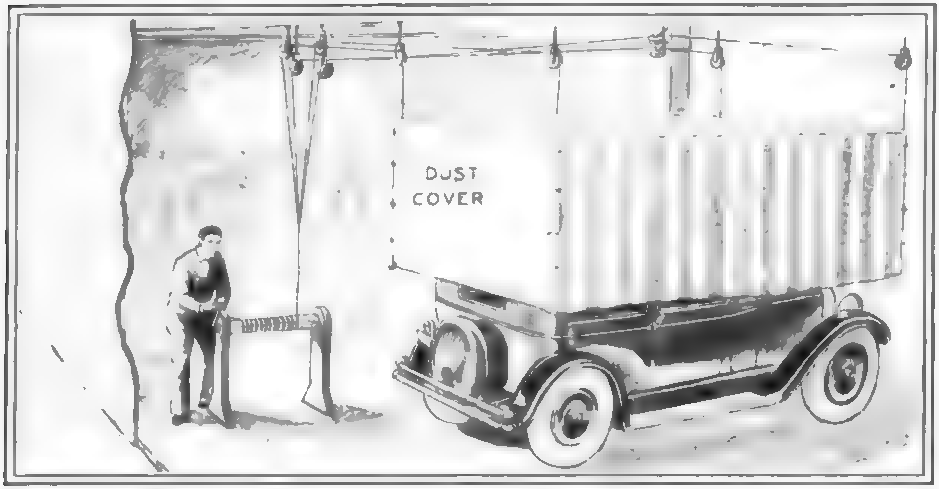


This handy luggage carrier is substantial enough to carry large bundles or even a boat. Sufficient air is drawn through the radiator by the fan to insure a cool motor even though the luggage carrier is piled high.

The method of attaching the bumper rail depends upon the design of the bumpers. Bolts are shown in the sketch, but the regular clamps provided with the bumpers can be used in many cases. Five strips of hardwood—½ in. by 1½ in. by 56 in.—bolted to the bracket arms with 5/16 in. carriage bolts, complete the luggage carrier.

The writer carried a portable boat thousands of miles on such a carrier. No unusual overheating of the radiator resulted when the circulating fan of the motor was working properly. The fan of any car will draw more air through the radiator than can be forced through by the forward movement of the car. So, if there is a space of ten or twelve inches between the radiator core and the bundle, no undue overheating will result.

A Dust Cover on Windlass Protects Car Stored in Barn



MANY farmers store their cars in barns or sheds in which there is likely to be considerable dust. Above is shown a plan used by one enterprising farmer in protecting his car, with the least amount of trouble.

A light, wood frame was made which was somewhat larger in width, length and height, than the car to be covered. Ten-ounce duck was then secured and sewed into form to cover this light frame, as shown in the artist's sketch. An ingenious system of pulleys was arranged overhead so that by turning a crank the entire cover on this wood frame would be lifted above the car and left suspended while the car was in use.

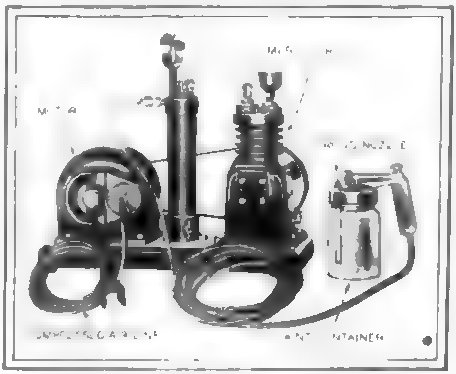
As a rule barns have the driveway left clear, sometimes having an over-loft above and at other times nothing between the floor and rafters. Circumstances will have to guide the builder of such a dust cover in arranging the pulleys. The suggestions offered here are quite practical.

A height of about sixteen to eighteen feet will be needed to allow such a device to clear the roof of the car when it is raised. The slight cost of material and labor will be more than offset by the protection afforded the finish and upholstery of the car.

Paint Spray Guns for Automobile and Shop Use Increase in Popularity

WHEN C. F. Kettering, of General Motors, set himself to find a method of painting automobiles which would give a job suitable for exposure to weather, as compared to the "piano finish" of automobiles in common use a few years ago, he hardly dreamed that there would be such a vast change in painting methods generally.

It is now possible to buy or fabricate outfits of a great variety of forms and capacities. One of the latest developments is the self contained unit shown. It consists of a motor, a small compressor, an air cleaner and pressure reservoir, together with paint container and gun connected to the air line. The outfit weighs less than fifty pounds and is easily portable. The main demands for good gun paint work are even pressure, clean air and a good gun. Many home-built outfits use tire pumps to create pressure.



Hydraulic Brakes Require Occasional Reconditioning

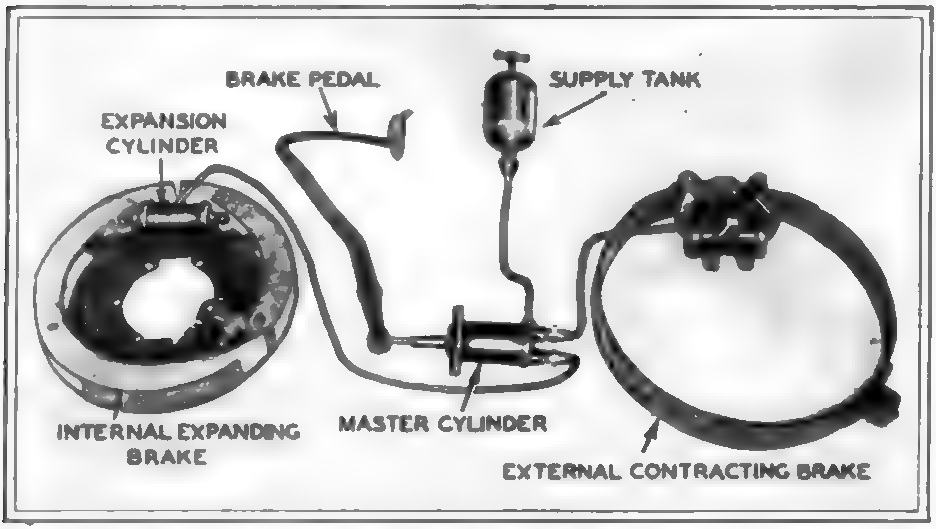


Figure 1. This photograph illustrates the layout of the hydraulic braking system. Pressure on the brake pedal forces fluid from the master cylinder to the expansion cylinders which actuate the brakes. For illustrative purposes both the internal expanding and the external contracting types are shown.

HYDRAULIC brakes are equalized automatically but are not adjusted automatically. When starting to put a set of hydraulic brakes into proper condition the brake bands or shoes are first adjusted to the brake drum. Next the brake pedal is tested out to see that the brake bands or shoes are set up to the drums when the pedal is depressed.

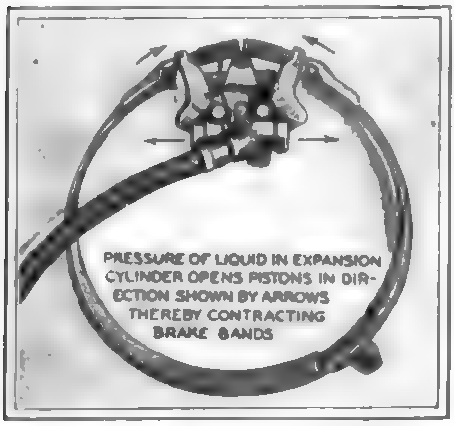


Figure 2. Here is illustrated the external contracting type of brake. Fluid hose from master cylinder is shown leading to the brake cylinder.

We will make a little study of the parts by which this is accomplished. The supply tank shown in Figure 1 above contains a reserve supply of the fluid used to fill the cylinders and the fluid lines. It is usually hidden away under the dash or under the engine hood. When the fluid has been partially lost from the cylinders, the pump handle is turned backward until the screw thread at the bottom is released. A stroke or two will then serve to replenish the losses, after which the valve and pump are screwed into position again to prevent the fluid backing up the line and being lost from the cylinders again.

When the brake pedal is depressed the plunger on the lower end will be thrown backward and the piston forced into the master cylinder. The fluid in this cylinder is forced out the lines to the front brakes and the rear brakes, each of which have cylinders actuating the bands or shoes. The enclosed expanding type of three-piece shoe and the exposed contracting type of band are both shown. These have been combined here for the sake of illustration. As a rule all wheels of the car are fitted with the same type of brake, either shoe or band.

When the fluid leaves the master cylinder

it flows with equal pressure to each of the four wheel cylinders, there to force the pistons outward and set the brakes. When cylinders of the internal expanding brake type shown in Figure 3 are filled the pistons expand outward and push the shoes ahead of them. The movement of the piston outward in the case of external contracting brakes (Figure 2) actuates two levers which pull the band together, as shown by the arrows. In any case the springs provided return the pistons in the brake cylinders and in the master cylinder and the fluid is thus returned to the master cylinder.

When the wear of the linings on the internal shoes, A, B and C of the type shown in Figure 3, is considerable the shoe may be adjusted outward to compensate for the wear by adjusting the screws at X, Y and Z. When wear of the brake lining of the bands such as that shown in Figure 2 occurs the band may be adjusted by tightening the nuts above the hydraulic cylinder.

Figure 4 shows the details of the wheel cylinders and the pistons. These are subject to leakage after much service. The cylinder may have the pistons removed. These are marked A in the photo. The cup washers, B, are the parts which need replacement under these conditions of leakage. Always use the fluid prepared by the company marketing the brakes for best service.

When refilling the tubes and cylinders of the hydraulic system, what is termed bleeding must be resorted to. When the fluid escapes or is drained from the system, air enters. Air is compressible, while the fluid is not. If any air remains it will be compressed when the foot pedal is depressed. To remove the air from any of the lines or any of the wheel cylinders first remove the dust screw at the top of the bleeder connection. Place a short length of rubber hose over the end marked X in Figure 4 and place the other end of the hose in a pint mason jar, end to bottom. Next unscrew X three-quarters of a turn and then pump fluid from the master cylinder until all air bubbles have been removed from that line. Bleed only one wheel cylinder at a time and then carefully seal the bleeder again before starting on the next one. In order to bleed the main cylinder the handle is removed from the supply tank. A little pressure on the foot brake will force the fluid up into the supply tank and any air with it. Fill the tank slowly, pump the fluid into the main cylinder until the brake pedal has returned to its proper position.

Hose connections similar to that shown in Figure 2 are used to convey the fluid from the tube on the car frame to the wheel cylinders.

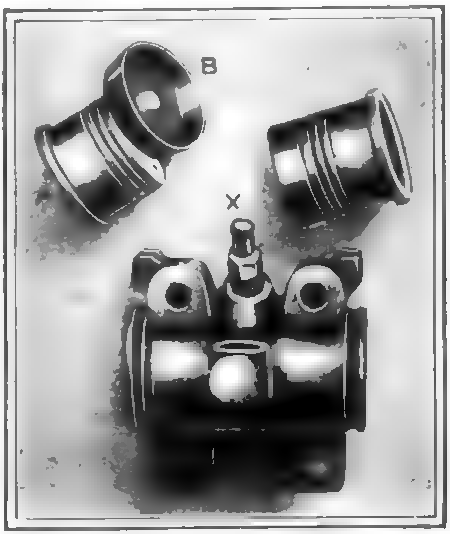


Figure 4. One of the wheel cylinders is here shown disassembled. The cup washer (B) of the piston (A) wears after constant usage and must be replaced.

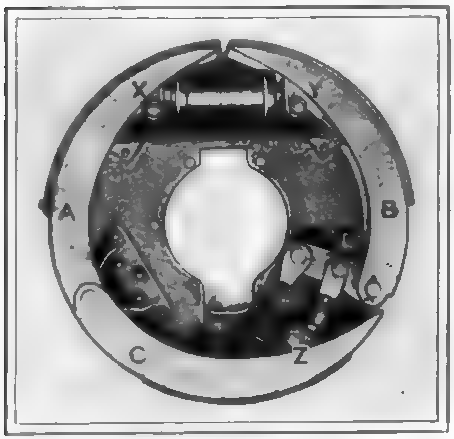


Figure 3. The adjusting nuts at X, Y, and Z may be tightened in this internal expanding type of brake to adjust the shoes A, B, and C when they show signs of wear.

LUMINOUS PAINT

Make Your Watches, Clocks, Etc., Visible by Night The very latest discovery in the scientific world. Hitherto, practically unobtainable except at an exorbitant price we have at last succeeded in producing this remarkable LUMINOUS PAINT which, applied to the surface of any article, emits rays of white light, thus rendering it perfectly visible in the dark. THE BRIGHTER THE DARKNESS THE BRIGHTER IT SHINES. Quite simple to use. Anyone—you can do it. A little applied to the dial of your watch or clock will enable you to tell the time by night. You can coat the push buttons or switch plates of your electric lights, match boxes, and innumerable other articles, make your own Luminous Cardboard, Luminous Numerals etc. Small bottle, price 25c. Larger sizes, 50c and $1 postpaid. JOHNSON SMITH & CO. Dept. 911. RACINE, WIS.

CIGARETTE MAKER

Roll your own and save money. Better and quicker, saves more than half. Use your favorite brand of tobacco. Neat, useful, handy pocket size, weighs but 1½ oz. Made entirely of metal, nickel plated. 25c, 3 for 60c postpaid anywhere.

GOOD LUCK RING

Very striking, quaint and uncommon. Silver finish metal, and arrowhead design, two brilliant, flashing gems sparkle out of the rare field to bring good luck. Only 25c ppd.

Exploding Cigarettes

JUST LIKE ORDINARY CIGARETTES. BUT SUCH REAL STARTLERS! The box contains ten genuine cigarettes of excellent quality. They appear so real, but when each cigarette is about half smoked, a charge gets a very great surprise as it goes off with a loud BANG! A great mirth provoker yet entirely harmless. Price 25c box.

NOVELTY BADGES

Missing Parent 10c *Garter Inspector 10c*

Two very novel metal badges, nickel plated, that you can wear giving you fun and laughs. Good for their trifling cost 10c, each badge. 3 for 25c, or 75c per doz. postpaid anywhere.

MIDGET BIBLE

GREAT CURIOSITY. Smallest Bible in the World. Size of a postage stamp 2x3 Pages. 600 in all. Will be a good luck to the owner. A treasure worth 1 cent. Must be seen to be appreciated. Make good money selling them to your friends. Send 2c stamp for specimens, etc. PRICE 15c each. 3 for 30c, 12 for $1.20, 100 for $7.50. Also obtainable in Leather Binding with gold edges. Price 50c each, 3 for $1.25, 12 for $4.00 each. Magnifying Glass for use with Midget Bible 15c.

STAGE MONEY

With a bunch of these bills, it is easy for each person of limited means to appear prosperous by flashing a roll of these bills at the proper time and reaching out a crumpled bill or two from the outside of the roll, the effect created will be found to be all that can be desired. Prices, postpaid: 40 Bills 20c, 120 for 50c, or $1.50 thousand postpaid.

MAGIC NOSE FLUTE

Pad Pad 10c

The Magic Nose Flute, or Romanatone is a unique and novel musical instrument that is played with the nose and mouth combined. There is just a little knack in playing it, when once mastered after a little practice will enable you to play tunes that were sweet music to the ear that resembles a flute. There is no fingering and once you have mastered it you can play such a lot of music with facility and ease. When played as an accompaniment to a piano or any other musical instrument, the effect is so charming as to be surprising.

SURPRISE MATCHES

More fun than fighting with your wife. Look just like ordinary matches. Put up in boxes just like regular Safety Matches. As the victim tries to light one he gets quite a surprise. Price 10c per box, 3 boxes for 25c, 12 for 75 cents.

STAR TOY MAKER

Greatest boys' book written. Tells how to make a Pinhole Camera, a Canoe, model Railroad, a Telephone, Boomerang, Telegraph Instrument, Box Kite, Talking Machine, Microscope, Electric Motor, Electric Door Bell, Water Wheel, Paddle Rib, a pair of Stilts, a Dog Sled, Bird House, Rabbit Yard, etc. 68 pages. 150 Illustrations. PRICE 10c postpaid.

Wonderful X-Ray Tube

10¢

A wonderful little instrument producing optical illusions both surprising and startling. With it you can see what is apparently the bones of your fingers, the lead in a lead pencil the interior opening in a pipe stem and many other similar illusions. Mystery that no one has been able to satisfactorily explain. Price 10c, 3 for 25c, 14 doz. 75c. Johnson Smith & Co.

NOSE BLOWER

When some men blow their noses it sounds like a trombone. Now the NOSE BLOWER has come to a rescue us. It is a surprise! It is humorously concealed in the handkerchief. Proceed to blow your nose and your friends will think they heard a steam engine or something. Then show the hole in it to your having a very bad cold and keep up the fun as long as you like. PRICE 10c 3 for 25c, or 75c doz. postpaid.

Serpent's Eggs

Box contains 12 eggs. When lit with a match, each one gradually becomes itself into a snake several feet long, which curls and twists about in a most lifelike manner. Price 10c per box, 10c postpaid, 3 for 25c.

BLANK CARTRIDGE PISTOL

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INVISIBLE INK

The most confidential messages can be written with the ink, for the writing makes no mark. Can only be seen when you know the secret. Invaluable for many reasons. Keep your postals and other private memoranda secure from prying eyes. Great fun for playing practical jokes. Only 15c a Bottle; 3 for 40c.

Rubber Chewing Gum

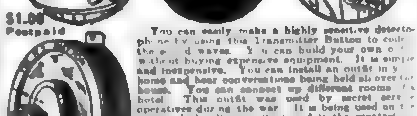
It is just like a regular package of chewing gum and looks so real that everybody will want some. No one can see it is not genuine until they try to chew it. There's a world of fun in it as rubber chewing gum. 5 cents a to the package. Price, 10c Pkg.; 3 for 25c; 12 for 75c postpaid.

Watch Charm Pistol $1.75

REAL PISTOL

Exact reproduction of a real pistol, actually fires REAL BLANK CARTRIDGES (new of miniature size. Illustration is actual size. The barrel is long enough to ring at and fire by striking the watch chain. Loads like a regular pistol. Pull the trigger and it goes off with a loud bang. Pistol is break open type. Illustration shows position for loading. Handsomely finished steel, nickel plated octagon barrel, handsomely engraved handles, complete in box with cleaning rod. PRICE $1.75 each. Also furnished with pearl handles, $2.50. BLANK CARTRIDGES 75c per box of 25. JOHNSON SMITH & CO., Dept. 911 RACINE, WIS.

MICROPHONE TRANSMITTER BUTTON



$1.00 Postpaid

You can easily make a highly sensitive detecting device using this transmitter Button to collect the sound waves. You can build your own outfit without buying expensive equipment. It is simple and inexpensive. You can install an outfit in your home and hear conversations being held all over the house. You can connect up different rooms of the house. You can connect up different offices. They were used extensively by secret service operatives during the war. It is being used on the stage. It is ultra-sensitive and is the greatest invention for amateurs. Sounds magnified 1000 times almost anywhere—card board boxes, oil paper, stiff calendars, on the wall behind a picture frame etc. Button is very light and small it cannot be detected. Persons can be overheard without suspecting it. You can listen in on conversations in another room. A deaf person by this outfit can hear the speaker. Connected to phonograph, piano or other musical instrument, music can be heard hundreds of feet away. Button may be used to receive telephone transmitters often makes an old fone "talk up" when nothing else will. The ideal telephone for radio use carries heavy current and is extremely sensitive. Amplifies radio signals. Countless other similar uses will suggest themselves. Experimenters find the button useful for hundreds of experiments along the lines of telephones, amplifiers, loud speakers, etc. Many fascinating stunts may be devised, such as holding the button against the throat or chest to record and speak without sound waves. Complete with cord, $1.00. JOHNSON SMITH & CO., DEPT. 911, RACINE, WIS.

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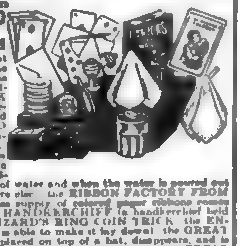

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It is great fun mystifying your friends. Get this Conjurer's Cabinet, and you will be the observed of all observers. It contains the apparatus for two first-class tricks, including The MAGIC BALL AND VASE TRICK (a thousands and thousands and upon request, placing the ball disappeared and is found in someone else's pocket). The HINDOO TRICK CARDS (can be made to change from one picture to another in less than five times) DISAPPEARING COIN BOX (a coin, placed in the wooden box, vanishes entirely on closing the box; a coin of another denomination). The GLASS GOBLET TRICK (a coin is dropped into a glass of water and when the water is poured out the coin has vanished and is found somewhere else). The RIBBON FACTORY FROM THE MOUTH TRICK (a seemingly endless supply of colored paper ribbons comes out of your mouth). The DISAPPEARING HANDKERCHIEF (a handkerchief held in the hand mysteriously vanishes). The WIZARD'S RING COIN TRICK. The ENCHANTED BOTTLE (no one but yourself is able to make it lay down). The GREAT HAT AND DICE TRICK (a large dice is placed on top of a hat, disappears, and is found underneath, yet no one has touched the hat). And last but not least the GREAT PIANO CARD TRICK, or two from here leaves nothing. Full instructions are sent for performing each trick. In addition to the above a number of other tests and illusions are fully explained for which you can easily make or procure the necessary apparatus. **Price complete, $1.00 postpaid. JOHNSON SMITH & CO.**

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Great curiosity. Place in water, plant opens up and starts to grow in few minutes. Taken out it dries up and goes to sleep until put in water again

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These clever Locks cannot be opened unless you know the combination. Each Lock has a different combination, the secret of which we send with the Lock. No key is necessary, simply arrange the numbers the proper order and the Lock opens. For your locker, bicycle, tool chest, mail box, thousands of uses. A good, strong lock, weighing about 4 ounces, that will baffle the attempts of all unacquainted with the secret combination to open it. **Price,** with secret and full instructions **Only 50c postpaid.**

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You may have a lot of fun with the little peephole A regular startler. Mysteriously set metal base, having a microscopic lens fitted into one end. While the victim is absorbed in admiration of the pretty picture, said turns the button in the confident expectation of seeing something interesting, a spring syringe is brought into action, and the observer experiences a very great surprise. **50c, p. pd. Johnson Smith & Co., Dept. 911, Racine, Wis.**

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Lots of harmless fun and amusement wearing these rings. Made in platinoid finish (to resemble platinum), with wording on enameloid, as illustrated. **Price only 25c Postpaid.**

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A great trick by which you can apparently breathe fire from mouth, to the horror and consternation of all. Quite harmless. All apparatus necessary sent complete in box for **ONLY 30c. p. pd. JOHNSON SMITH**

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A REAL STARTLER. This is the most popular of all comic tricks. The flower in your coat looks so fresh and sweet that you cannot help but inhale the delightful perfume. Then is the moment to press the bulb. Ooooh!!!Gee Don't they jump? There is a very long rubber tube that easily reaches to the pocket of your coat or trousers, and the bulb is large enough to make a decent shoot with one handing. **PRICE 25c each, or 3 for 60c postpaid.**

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Seeking the Lost World

(Continued from page 68)

incomplete; and furthermore, because, no matter how thorough might be the native's knowledge of the natural contours, it was inevitable that they would tend to swerve somewhat afield from any prescribed course. Permit me to point out that in jungle-land, Mother Nature's presumably permanent plans are prone to change almost overnight. For example, one day the rivers might be extremely low and yet the very next day, following a heavy fall of rain, assume such a great height as to be totally unrecognizable—at least for a while.

"Yet treacherous guides though they were at times, the streams were after all my most dependable means of transportation in the long run, as was conclusively demonstrated on those frequent occasions when we had to abandon boats and literally chop our way through the thickest kind of vegetation. No wonder that there were times, particularly during the latter stages of the inland trip, when I became so completely lost in the jungle labyrinths that after perhaps a full day's travel I found myself surveying, with the utmost disgust, the familiar scenery of a region I had earlier traversed.

Untrustworthy Guides

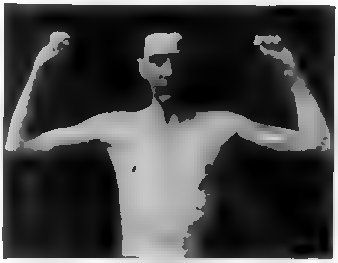
"Still another unsatisfactory condition existed in the peculiar habit of the various Indians we met, of expressing a willingness to go so far from their native haunts and not a jot further. Three or so of them, let us say, would be transporting my black and myself through a good-sized body of water, when entirely without warning, they would paddle to shore, motion us to step out, and leave the vicinity instantly, notwithstanding the thickness of the forest.

"By and by I began to realize that such action was probably due to our ever-increasing nearness to the region of the 'Lost World,' where all manner of supernatural spirits of evil practises were supposed to dwell. In any case, the more we plunged into the woods, the less frequently did we see the yellow Indians, and in consequence our journey was necessarily far slower than it had been in its earlier stages, for we could no more depend upon canoe transportation.

"However, our very last inland trip under Indian guidance was very much

YOU'RE NEXT

Now Watch YOUR Muscles GROW!



ONE!

ONE- two—three' Look at those pictures' They show the three stages in building muscles. They show how a puny weakling may be changed into a physical GIANT when muscles are developed *progressively*. It takes SCIENCE to build muscles like that And that's why Titus Training has accomplished such amazing results for thousands of men. Titus Training develops *every* muscle in the body. It makes muscles *GROW*. Step by step it builds them up—makes them bigger and bigger—until your whole body is covered with mighty layers of live, solid *strength*.

Come on, friend, you're NEXT. I don't care how weak or how strong you are now—or whether you're 20 or 50. If you are organically sound, Titus Training will work its wonders for YOU.

I've taken fellows of every size and condition and transformed them into splendid specimens of manhood! I've been doing it for years. "Miracles worked in Muscle" people call them.

TWO!

I'll Increase Your Muscles by INCHES

Yes, sir, just give me a few minutes a day in the privacy of your own home. I'll put layer after layer of muscle all over your body till they stand out like iron bands. And they'll be panther muscles, friend muscles as live as spring steel—with the speed of lightning and the power of a battering ram. Those are the kind of muscles that make champions, the kind of muscles that will make you laugh at men twice your size!

THREE!

NOTE: The pictures above are a diagrammatic visualization of the progressive development of the entire muscular system. They typify the results reported by thousands of Titus-trained men, who through the Titus system of progressive development have made their muscles GROW

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Fellows of this type are not wanted. If you are a weakling, sickly, nervous and always pessimistic—you will feel your inferiority wherever you go. Men will shun you. Women will not be attracted to you. Even dogs will bark at you.

It is the penalty you pay for weakness!—but you won't have to pay this price if you will face the facts and make up your mind you are going to go to the mat with ill-health and fight to a finish. It's up to you—to you alone. You can overcome weakness.

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Headache	Overweight	[illegible]
Rupture	...Weak Back	Increased Height
Thinness	Weak Eyes	Muscular Development
Pimples	Short Breath	Great Strength
Insomnia	.Weak Heart	

Private Ailments .....

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Seeking the Lost World

worth while. For some few miles we had been trudging along, our ears fairly glowing with the sound of water which must be falling from a great height, when all at once we came upon boulders of massive size. After camping in the vicinity for a couple of days we met a half dozen Indians, and persuaded them to lead us in the direction of what must be a good-sized waterfall.

"Very soon we found smaller cascades in the midst of very picturesque scenery. This was after we had been travelling via canoe for three-fourths of a day following a series of rough-going portages. A couple of hours more and our two canoes could go no further for we had struck a series of large pools and swirling rapids. So there was nothing to do but tie up our boats and once again fight our way through the brush.

"After a solid day of this my astonished eyes were given the treat of a life-time. Amid an almost deafening splash of waters I could see towering above me the mighty waterfalls dubbed 'Kaieteur' by the natives and stretching easily five times as high as our own spectacular Niagara.

"Not content to view this masterpiece of nature from below, I persuaded the Indians to lead me to its summit. Three days arduous travel brought success. Here indeed was the world's great jumping-off place. It afforded a magnificent view of a giant plateau possibly 15 miles away that stretched in many directions from a height that must have been at least several thousand feet.

"The conviction came to me that the plateau must be indeed the 'Lost World.' and the Indians, via sign language, showed me that they held the same belief. So that once we had descended to the ground, I persuaded them, despite their obvious fear of going further, to guide me. But after about three more days travel through a rough table-land their superstitions got the better of them and they left me.

"This was rather a pretty pickle for me. My black seemed frightened to the marrow, but since he knew not a thing about the region, he simply had to stick by me. I had been suffering from malarial attacks for some few days and my entire body was covered with thousands of little bugs and mites. I should have mentioned

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Seeking the Lost World

earlier that immediately a man sets foot into the British Guiana jungles he becomes parasitized, which means a continual itching for him as long as he remains.

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Dr. Williams wants to explode some absurd fairy-book ideas about jungle conditions—particularly the one to the effect that normally a great many wild creatures are visible to the casual observer. "Sometimes," says he, "the explorer can go as many as 60 days without seeing a solitary living creature, the reason being that most jungle dwellers live in the so-called jungle-roof, that extremely thick growth of foliage, plants and trees that oftentimes is able to prevent rain from hitting the ground for three days.

"However, the trained observer can see many queer creatures if he is willing to spend the time to look for them. For instance, if he spends a half hour's research near the British Guiana rivers he may note the torpedo eel, growing sometimes three feet long and which if stepped on will actually give a man an electric shock.

"Even the simple act of putting a glass into a jungle river may reveal thousands of fantastic-looking parasites, eels, worms, or what have you? The experienced 'jungaleer' will therefore take great care to sterilize by means of powerful disinfectants, the water he drinks, or he may swallow tiny parasites that are the cause of serious liver ailments."

Piano, Two Gorillas in Air Cargo

WHEN the *Graf Zeppelin* started out recently on its trip to the North American continent and was forced to turn back because of engine trouble, a pair of gorillas and a grand piano were among the passengers and luggage. The gorillas were being shipped to a zoo in the United States and the piano, one of an expensive German make, was part of the freight cargo.

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English Light Planes

(Continued from page 87)

very light planes. Powered in each instance with standard motorcycle engines these little ships proved that low powered flight was not only possible but also in many instances startlingly efficient.

The illustrations show representative types of the light planes which participated in the Lympne competitions of 1923-4-5.

The English Electric Co. "Wren"—This little ship was the forerunner of all the light English planes. Powered with a 2¾ h.p. A.B.C. motor it put up some astonishing flights in 1923. It had a ceiling of about 2,000 feet and is a true example of the genuine motor-glider. At the first Lympne competition the "Wren" flew in very strong winds and its success in winning the fuel consumption contest was probably due to the pilot taking advantage of the soaring ability of this machine.

The Avro Motor-Glider—A very light biplane powered with a 5 h.p. Douglas motorcycle motor. There is no undercarriage on this ship, the wheels being mounted directly to and inside of the fuselage. The "I" struts forming the inter-plane struts are very simple and light, being built up of single streamline struts of wood with dural V shaped fittings attached top and bottom of the strut. This little ship attained an altitude of 13,850 feet in the 1923 altitude competition.

The R. A. E. "Hurricane"—An interesting little monoplane with a "vee" shaped fuselage and powered with a 5 h.p. Douglas motorcycle motor. In the first competition this plane was not particularly successful due to motor trouble and lack of sufficient power. In the 1924 competition the same machine was fitted with a 16 h.p. Bristol Cherub and performed very well indeed, being noticeably speedy.

Parnall "Pixie Mk. II"—A low-wing monoplane with many interesting features. The undercarriage consists merely of two steel tubes built into the fuselage and raked slightly forward, carrying a steel tube axle which overhangs the supporting tubes by something like a foot. The elasticity of the overhanging axle together with the tires is the only springing provided. Powered with a 7 h.p. Douglas motorcycle engine and with clipped wings the wing loading of the "Pixie" is about 8 lbs. per sq. ft.

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English Light Planes

The total area of the plane is 60 sq. ft. The fastest plane in the competition, it attained speeds of nearly 100 m.p.h. with its 7 h.p. engine and was flown by Capt. Courtney, the famous pilot who tested the Cierva "Auto-Gyro" and who now is in this country flying Sikorsky Amphibians.

Parnall "Pixie Mk. III"—Apart from its larger dimensions and more powerful motor, and that the legs supporting the undercarriage axle are telescopic with steel springs, the Pixie III has the same characteristics as the Pixie II.

The engine is a geared down Bristol Cherub Mk. II rated at 16 h.p. The plane is so designed that it can be converted into a biplane by the addition of a top plane supported from the fuselage by a steel tube cabane, and by a pair of raking interplane struts.

D. H. (De Havilland) 53—An astonishingly successful plane with exceptional performance which has enabled it to pass the drastic tests of the British Air Ministry for the "Aerobatic" license which they only issue to planes which may be safely stunted. Powered with Douglas or Blackburne motorcycle motors of approximately 6 h.p. rating it was used considerably by the Royal Air Force as a training plane. A conventional low-wing monoplane in every respect, it is a sturdy little ship quite suitable for cross-country work.

The Gnosspelius "Gull"—A thin-wing monoplane with a single 6 h.p. motorcycle motor mounted in the fuselage, just behind the pilot, driving twin pusher propellers by means of chains running in steel tubes. There is no undercarriage, properly speaking, the wheels being attached to an axle which is sprung to the plywood fuselage by means of rubber cords. In spite of the fact that the thin wing section led to varying troubles with wing flutter this machine put up some notable performances and was used for several years by one of the Light Plane Clubs.

The Vickers "Viget"—A normally braced biplane on a small scale. Practically the only novel point of this ship is the folding wing feature which allows it to be parked in a space only 8 feet wide. The folding operation is simple and strong. Powered with a 6 h.p. horizontally opposed two cylinder Douglas motorcycle engine.

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English Light Planes

The Bristol "Brownie" — A low-wing cantilever monoplane of metal construction. The wings are of distinctly thick section at the roots and taper noticeably towards the tips but relatively little in chord. They are set at a pronounced dihedral and are fitted with ailerons which taper from a very small chord at their inner ends to a maximum chord close to the tips. The undercarriage is similar to the Pixie Mk. II with the difference that the two supporting tubes are braced by steel wire fore and aft to the fuselage.

The Cranwell Light Aeroplane Club's Monoplane—Built by the boys at the Cranwell Air Force Station—A high wing monoplane with V strut wing bracing and a very well streamlined fuselage. The engine is a Bristol Cherub. The wings are of normal construction and of the thick section now so much in vogue. They are supported by 4 vertical struts at the fuselage and by the already mentioned V struts on each side of the body. This machine is a speedy little

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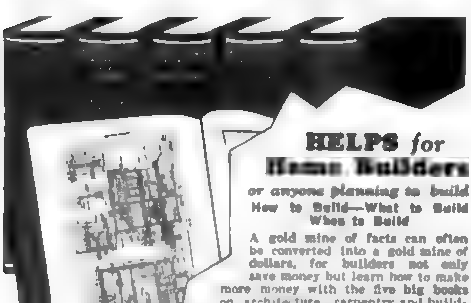

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English Light Planes

crate and won the high speed test at Lympne in 1925.

Short Bros. Light Seaplane—"Stellite"—The first light seaplane and particularly interesting in that it is entirely constructed of metal with the exception of the wing covering which follows general practice and is of fabric. Powered with two Blackburne Vee twin engines of 18 h.p. each the "Stellite" is a thoroughly practical little seaplane and was designed to comply with the requirements for a Certificate of Airworthiness. Each engine is fitted with a hand operated starter similar to the kick starter of the motorcycle. The operating levers for these starters are in the pilot's cockpit.

Editor's note: Modern Mechanics can furnish no more information concerning the planes shown here than is contained in Mr. Rolfe's article.

Easy Magic for Everybody

(Continued from page 134)

former continues, back turned to the spectator. "Take the first two numbers of your four and turn to that page in the book. Take the third number and use it to designate a line. Take the final number and use it to find a word in that line. Underscore the word."

The book is then closed and handed to the performer. He holds it to his forehead and immediately calls out the underscored word!

Like this: The answer is always 1089, regardless of what figure is selected. You should inform the spectator, however, that if his number is less than 100 at the conclusion of the first operation he should place an 0 before it before making the final addition. Thus:

453
354

099
990

1089

The other part of the trick has to do with memorizing the ninth word in the eighth line on the tenth page in the two or three books which you offer the spectator. Naturally enough, with all this assistance and preparation you find no difficulty in . . . but why elaborate?

Can I Fly?

(Continued from page 75)

ear in order to relieve themselves of the discomfort and liability of rupture of the ear drums attendant upon rapid ascents and descents. A rupture of the ear drum is a very painful experience sufficient to render one temporarily inefficient. The nasal passages should be free from obstructions as these are conducive to sinus infection which in itself may be sufficient to incapacitate a man and it always affects the vision and muscle balance of the eyes. Nasal obstructions in themselves interfere seriously with breathing at higher altitudes. This in civilian flying is not so important as in military flying where such a condition constitutes an absolute disqualification.

How's Your Sense of Balance?

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To those familiar with war time flying the elimination of the whirling chair is somewhat surprising. This piece of apparatus had then just been introduced by Barany and formed the backbone of the pilot's physical test of those days.

However, after some two thousand articles have found their way into medical literature the consensus of opinion is that while the chair gives a good deal of information, no one has been able to link this in a practical way with *flying*. Therefore, at present the chair is *out*, and anyone who can perform the balancing tests satisfactorily is considered as having sufficient equilibratory sense for civilian flying.

Tonsils and dental conditions are considered only in the bearing they have on the candidate's general health. Certain chronic or recurrent diseases, as asthma, for example, are liable suddenly to incapacitate a flyer and are disqualifying. Others such as hay fever or moderately advanced tuberculosis constitute no especial handicap and are not disqualifying.

Organic heart disease naturally disqualifies, as do certain afflictions of the stomach, intestines and kidneys, which are liable to develop serious conditions without warning. A rupture, though having never caused any trouble is a serious condition, in any walk of life and especially so to a flyer. Acute strangulation comes without warning and

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may be so painful as to practically paralyze the sufferer. Such a condition calls for immediate relief by operation and every hour surgery is delayed decreases rapidly the chances for life.

For this reason passenger carrying pilots may not have a hernia of any degree, and private pilots only of a very slight degree.

Broken Bones

Old fractures and impaired joints are considered only in the degree in which they limit motion of the affected limb. Missing members are disqualifying only when of such extent as to interfere with the proper manipulation of the controls.

A well organized nervous system is an asset to anyone. To the flyer it is a prime necessity. Any man who becomes excited or loses his head when things go wrong or who is inclined to throw up his hands and pray in an emergency should not consider aviation as a vocation. While there is, of course, no objection to breathing a silent prayer the prospective pilot will do well to have his prayers so well committed to memory that his attention will not be distracted at inauspicious times.

Condition Important

The strain of flying strikes most severely at the nervous system and it behooves every active aviator to try to maintain himself in the pink of condition by hygienic living and avoidance of excesses if he hopes to become an old flyer. Flying, in common with baseball playing and prize fighting, demands quick, accurately controlled and accurately timed reactions. These are the attributes of youth. Anything that hastens age hastens the time when the pilot is finally superannuated; finally "washed out." The Department of Commerce has no maximum age limit. Ability to meet the requirements is all that is asked. Minimum age limits are 16 for private pilots and 18 for commercial.

Because a man is fit today is no indication that he will continue so indefinitely. For this reason commercial pilots (except industrial) are examined physically, semiannually, and private pilots annually. This, instead of being a handicap will in time prove itself an advantage of no mean order. Many minor ailments that would in time develop serious proportions will be picked up and

eliminated. The saving of time lost by sickness or disability, to say nothing of other advantages, will far overbalance any inconvenience or expense entailed.

The foregoing brief outline of the physical examination of airplane pilots omits many details of technical nature. It will be evident that the most desirable man is a well balanced man. Geniuses are not especially adapted to aviation because such persons are always overdeveloped in one particular at the expense of the remaining faculties. It is doubtful if any of our great pilots would have ever been heard from had aviation not come within the sphere of man during their lifetimes, thus creating a field demanding men of their peculiar makeup.

Efficiency Is Test

One other thing needs to be said. The ability to pass a life insurance examination for $10,000 has no direct bearing on one's qualifications as an airplane pilot. The insurance company is interested only in the probable longevity of the applicant, not in his efficiency. The Department of Commerce, on the other hand, asks as to time, only that he survive the period of his license, but during the life of that license he must function efficiently. To this end, for example, the aviator is disqualified on ocular defects and passed on moderately advanced tuberculosis, while the applicant for insurance is not required to take any eye tests but is forever damned by even a slight tubercular activity.

And lastly the Aeronautics Branch of the Department of Commerce and its agents are striving honestly, earnestly, and wholeheartedly for the best interests of aviation. Such errors as do occur will probably be found on the side of generosity rather than on the side of overstringency.

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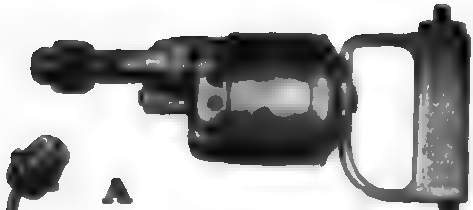

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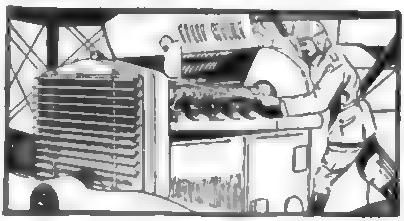

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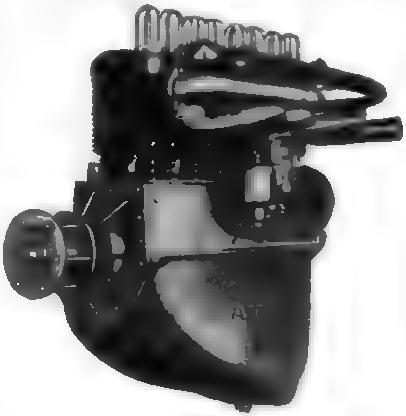

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Send me particulars about positions marked "X"—salaries, hours, vacations, "How to Qualify", etc.
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Saving Drowning Victims

(Continued from page 153)

possible, an approach from underwater may work admirably.

An important word of warning during all rescue maneuvers is to see to it that every "helper" on hand should be placed in a definite task. For example, if three intelligent people are on the scene of a near-drowning, a wise procedure is to select one to take charge of keeping crowds out of the way, and the other two to help him. Otherwise the vital process of artificial respiration is liable to be in vain, due to undesirable interference from overzealous and unqualified persons.

More than 250,000 expert swimmers throughout the country have been enrolled to spread the doctrine of safety. Life saving tests are given by the Red Cross at all times, and youths are ever attempting to pass them successfully. Medals and emblems are given as an incentive.

The daddy of all Red Cross authorities on swimming is Commodore Longfellow, who has taken his message into every state in the union over a long period of years.

STOMACH cramps from indigestion usually come from going into cold water too soon after eating a hearty meal. The knees double up underneath the chin and make it impossible for even an expert swimmer to escape. The air is expelled from the lungs and the victim sinks quickly.

Youths in their folly sometimes disregard this all-important law of swimming. Drowning results, and many a happy party has been broken up by a tragedy of this sort, simply because the swimmers did not use good, common sense.

Fear is probably the greatest evil of all. The terrible sensation of sinking into the swirling depths of a black pool drives all reason from even the sanest. He grasps at anything and everything. These death-like grips must be guarded against by the rescuer or he will find himself being pushed down with the person whom he is attempting to save.

The human body will stay afloat with extremely simple movements of the hands and feet. If a person keeps a clear head in a water disaster and attempts to help himself, he can usually stay above the surface.

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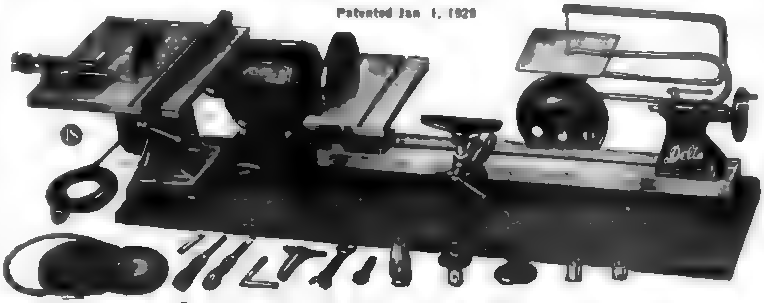

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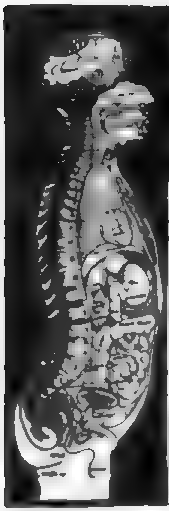
Saving Drowning Victims

until help is available from someone who sees his predicament.

Swimming in unfamiliar waters is perhaps the fourth greatest reason why drownings occur. If it is done at all, the pool or river should be thoroughly investigated before any diving is done. Submerged boulders, barbed wire, glass and other dangerous objects have been the cause of many a good swimmer's death. Even wading, for an inexperienced swimmer, is extremely dangerous. "Step-offs" have taken their full toll of drownings.

Canoe accidents are not as much a contributing factor in deaths as many persons believe. A canoe will support its passengers even when it is full of water, provided they allow the entire body with the exception of the head and arms to remain under water while they hold on to the canoe lightly. A rowboat is far more dangerous.



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Moving Oceans Inland

(Continued from page 43)

Coolidge's committee was the St. Lawrence Commission of the United States with the then Secretary of Commerce, Herbert Hoover, as chairman and Charles P. Craig as executive secretary.

Since then there has been a wide interchange of letters between this country and Canada. The next step, which seems to loom in the near future, is the appointment of an international commissioner or commissioners to phrase a treaty between the two nations.

The five Great Lakes are international waters which form the boundary between the United States and Canada from Minnesota to New York. Considered from the standpoints of their area and commerce they constitute the most important fresh water group in the world. They are directly concerned with the prosperity of over 40,000,000 Americans and afford access to regions notable for the magnitude of their natural and industrial resources.

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To further develop these great waterways on a large scale would be a masterly stroke of modern-day engineering genius. Moreover, the deepening of the St. Lawrence would also involve the development of the huge hydro-electric power from the great rapids which now obstruct navigation on the river. This is the largest profitable hydro-electric power development on the North American continent and the dams necessary for further increase of power would create a series of pools in place of the present rapids, which, with the supplement of locks and short canals, would constitute the shipway.

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the project, is shown by the fact that 23 states have associated together by acts of their legislatures under the name of the Great Lakes Tidewater Association. Representing close to two fifths of the nation's entire population, the organization is working heroically to accomplish its purpose.

Actual construction will be apportioned between the two countries as follows: as tentatively proposed by Canada and assented to in principle by the United States, the proposed works lying within international waters shall be constructed by the United States, whether lying on the American or Canadian side of the line, and all works within Canadian waters shall be built by Canada. In other words, the United States will bear the expense of deepening the connecting channels between Lake Superior and Lake Erie and construct the proposed works in that portion of the St. Lawrence River from Lake Ontario to the point where it ceases to form the international boundary. Whereas Canada, at its own expense, will complete the new Welland Ship Canal (probably by 1930) and will build the proposed works in that section of the St. Lawrence lying between the international boundary line and the sea.

As to cost, the United States will have to pay in the neighborhood of $123,000,000 while Canada will spend about $200,000,000. It is expected that the seaway would be open to navigation in seven to eight years from the time that active work had been started.

NOW as to the third project, the Riker Spillway.

Down in the lowest depths of the historic Senate Office Building in Washington, D. C., a gigantic engineering model of the Riker Mississippi Spillway stretching some 75 feet long and about 12 feet wide, serves as a working plan of a waterway expert. Carroll L. Riker, whose age has passed the 80 year milestone.

His model represents a plan designed, after almost a quarter of a century of intensive study, to make a docile infant of the turbulent Mississippi, controlling its treacherous floods, making its vast power far more available to the nation, affording well nigh perfect drainage, irrigation and

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better climatic and health conditions throughout the valley.

Riker, a kindly, patriarchal man who has spent the best years of his life studying dam construction, explains that as far back as the years immediately preceding the World War, he had succeeded in interesting certain of Uncle Sam's waterway experts in plans for the curbing of the Mississippi and its tributaries. But the war upset these plans to such an extent that not until recent years did government authorities again lend an ear of uninterrupted interest.

Back in 1928, Congress, forced to action by the disastrous floods that had been exacting such a terrific toll of life and property, appropriated $325,000,000 for control of the Mississippi's flood waters. But the scheme thus far hasn't shaped up as hoped for by Congress, particularly since a recent break in the work resulted in virtually desperate efforts to prevent breaks in levees at other points. So Riker, backed up by Senator Lynn J. Frazier of North Dakota, among other prominent persons, is agitating the building of the huge spillway.

Now the term, spillway, as the name implies, means a scientific "spilling", or taking care of flood waters, so that they can do no damage. And in a word, the Riker plan proposes to accomplish this by virtue of the engineering process of quickly disposing of excess waters by deftly sluicing them to one side, though in as straight a line as possible, and then to the point of delivery.

Under the Riker plan, a strip of land from Cairo, Ill., to a point 150 miles west of the mouth of the Mississippi, three miles wide, would be confined on each side by

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an embankment, or levee of great size and width, divided laterally into two halves by a third levee. By such division, one levee could be used for navigation while another could be employed for agricultural purposes. Or it even could be kept dry for years, if emergency occasion so demanded. The land on which the strip is located could be purchased readily by the Federal government from the states which it traversed at a reasonable price.

This wide spillway, running almost in a straight line to the Gulf, proponents of the plan say, would forever do away with the menace of floods. For it would tap the Mississippi near Red River Landing and receive all its excess waters there, and act similarly where it crosses the river above Vicksburg, recrosses it below Memphis, and at a point just below Cairo.

Now comes what certainly are the most unique phases of the Riker project: the inventor claims that his spillway, or Overland Seaway, as some choose to call it, might within a comparatively few years be the greatest man-made navigable deep-waterway in the world, reducing by 50 per cent the water-route distance between the Gulf and Cairo, Ill., as compared with the present distance by river alone, and largely supplant the latter for navigation use. The point that almost staggers the imagination in this connection is that not

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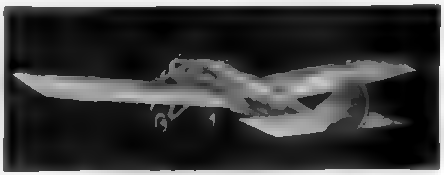

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only will there be locks for small vessels, but that the Riker plan also calls for locks more than *twice* the length of those of the Panama Canal. In other words, the space between the levees would be dredged to a depth sufficient to permit the largest steamships in the world to regularly navigate the river's entire length from Cairo down to the Gulf.

Thus the city of Cairo would be brought to within 48 hours of the Gulf. In fact, Mr. Riker says: "My plan would practically make Cairo a seaport. It provides slack water for navigation, having a minimum depth of over 40 feet over the locks, an entirely ample width clear to the Gulf of Mexico, where there is the finest harbor entrance in the world both as to depth and approach. There is even a rattling good probability that if my scheme were carried out, the commerce of Cairo should, within 50 years' time, become greater than that of any other port in the world.

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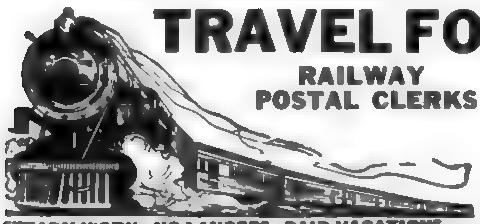

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Still another unique, and even revolutionary phase of the Riker plan is its proposal to construct a series of gigantic monster dams. Explains Mr. Riker: "There would be about 10 reinforced concrete dams crossing the spillway; each would be provided with a continuous series of gates extending full length, and superimposed upon each dam would be a roadbed forming a bridge for railroad and vehicular travel across the spillway. Wherever required for travel there would be built additional bridge crossings made of reinforced concrete and so made as to be uninjured by floods and able to function as eveners of the depth of flood waters passing through the spillway."

THE inventor points out that once the Riker Spillway were completed (granted that Congress eventually gives approval to its construction), work upon the Mississippi, looking to its complete canalization, should begin; first, by the construction of the master dams across the river; one just below the spillway's mouth near Cairo; one just below where the river is crossed near Memphis; one below the recrossing near Vicksburg; and also one below where the river is connected with the spillway near Red River Landing. These master dams, Mr. Riker further explains, should be provided with gated control of the waters passing down the river, with locks for navigation and with plants for the generation of electric power.

As for the cost of this great project, the inventor says: "The canalization of the

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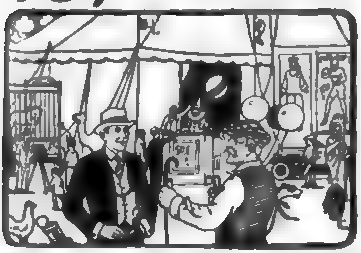

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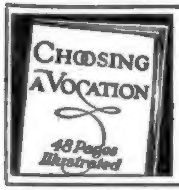

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	34x4	3.50	1.15	30x5.25	2.95	1.35
	32x4½	3.20	1.45	31x5.25	3.20	1.35
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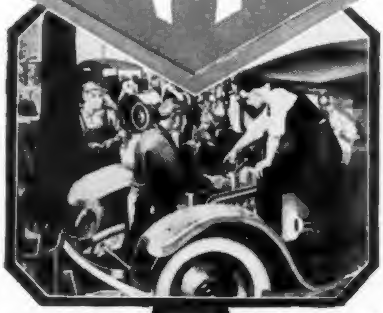

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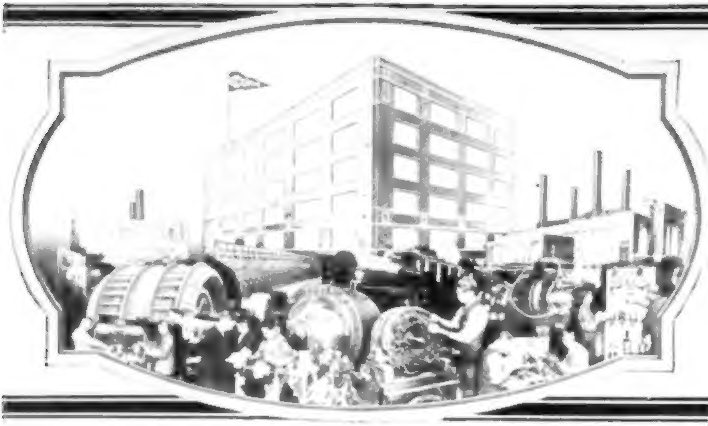

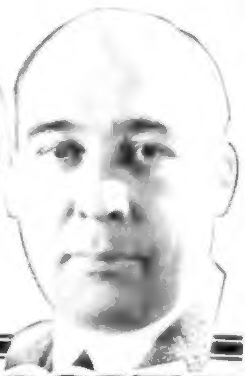

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